Vineet M. Arora
Informational Packet on Handoff Work

Patient Handoffs

1. Biography
2. Bibliography with electronic links
3. Media Coverage
4. Summary
5. Copies of papers not electronically available

For more information, please email us at:
patienthandoffs@gmail.com

Contact Information:
Vineet Arora, MD, MA
Associate Professor, Department of Medicine
Assistant Dean Scholarship and Discovery, Pritzker School of Medicine
Associate Program Director, Internal Medicine Residency
University of Chicago
Email: varora@medicine.bsd.uchicago.edu
Phone: 773-702-8157
Fax: 773-834-2238

Vineet M. Arora Handoff Biography

Vineet Arora MD, MAPP is an Associate Program Director for the Internal Medicine Residency and Assistant Dean for Scholarship and Discovery at the Pritzker School of Medicine for the University of Chicago. Dr. Arora's academic work focuses on resident duty hours, patient handoffs, and quality and safety of hospital care. Her scholarly work has appeared in numerous journals, including *Journal of the American Medical Association, Academic Medicine*, and the *Annals of Internal Medicine*, and has been reported by the New York Times, CNN, ABC, and US News & World Report. She has provided testimony to the Institute of Medicine on her work on resident duty hours and handoffs. She has also testified to Congress on the need for physician payment reform to improve medical student interest in primary care. As an academic hospitalist, Dr. Arora supervises internal medicine residents and students caring for hospitalized patients.

Dr. Arora is a nationally recognized expert on handoffs in healthcare. She is the Principal Investigator of an Agency for Healthcare Research Quality (AHRQ)-funded grant to evaluate handoff quality among hospitalists and residents. She also led the Society of Hospital Medicine's task force to develop handoff recommendations for hospitalists, which was adopted by the Society of Hospital Medicine board and was published in the Journal of Hospital Medicine. She has served as consultant for numerous healthcare organizations on handoff improvements including Illinois Hospital Association, Michigan Health and Safety Coalition, Maryland Patient Safety Center, MacNeal Hospital, Washington Hospital Center, and Clarity Group. In addition to numerous publications, Dr. Arora has published several book chapters including chapters in the Joint Commission Journal on Quality and Patient Safety and in Just the Facts Hospital Medicine.

Dr. Arora is a frequent invited speaker on handoffs and has spoken on this subject at the following national meetings:
Accreditation Council for Graduate Medical Education (ACGME)
Institute of Healthcare Improvement (IHI)
Association of American Medical Colleges (AAMC)
Joint Commission
American Medical Association (AMA)
Alliance for Academic Internal Medicine (AAIM)
Society of Hospital Medicine (SHM)
Society of General Internal Medicine (SGIM)
Harvard Quality Colloquium
Association of Chiefs of General Internal Medicine (ACGIM)

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Vineet M. Arora, MD, MAPP
Informational Packet on Handoff Work

Media Coverage of Handoff Work

Today's Hospitalist Magazine "Exploring a weak link in hospital care: handoffs and signouts" (3/06)

Health Leaders Media "Doctors detail good physician handoffs" (1/07)

The Hospitalist "A Hands-on Approach to Hand-offs" (8/07)

Medscape "Medication Discrepancies in Sign-Outs are Frequent and Potentially Harmful" (5/07)

Medscape Today "Postdischarge Adverse Events Are Common, But Not As Common In Elderly" (4/09)

ACP Hospitalist "Improving handoffs through better communication" (7/09)

New York Times "When Patient Handoffs Go Terribly Wrong" (9/09)

American Medical News "Resident duty hours: Does more sleep mean safer care?" (10/09)

Hospitalist Leadership "Hospitalist handoffs more about skills than checklists" (11/09)

The Hospitalist "Medical Mistakes, 10-Years Post-Op" (11/09)

The Hospitalist "Incomplete Handoffs Hinder Patient Safety, Workflow" (12/09)

Residency Program Alert "Improve resident handoffs with ten best practices" (1/10)

Residency Manager "Verbal and Written Handoff Tips to Share with Residents" (1/10)

Medical Staff Briefing "Help hospitalists' communication skills during handoffs" (1/10)

Health Leaders Media "10 Ways to Improve Handoffs in Your Hospital" (2/10)

American Association of Medical Colleges (AAMC) Reporter "Resident Workload Debate Unveils Bigger Picture" (3/2010)

Health Leaders Media "Develop a Handoff Training Program" (4/2010)

Vineet M. Arora, MD, MAPP
Informational Packet on Handoff Work

Summary of Handoff Work

At the University of Chicago, I have been working with social scientists, physicians, educators, and trainees to examine handoffs using theories from communication science and process improvement. Together, we have also been attempting to understand how to best ameliorate uncertainty after a handoff and develop novel ways to teach and evaluate handoffs.

Handoffs as communication
In general, there is an inherent assumption that handoff communication can be improved. However, its important to highlight work of Keysar and others that suggests that certain communication heuristics can systematically contribute to miscommunication. The first is that speakers often overestimate the effectiveness of their communications. The second is called the 'egocentric heuristic' which describes that senders often assume that receivers have the same information that they do. Interestingly, this actually worsens the more familiar you are with someone. Therefore, senders are most likely to miscommunicate with those that they know best due to inherent assumptions they make about receivers.

We have explored these theories in our work on handoffs. We chose to work in our pediatrics residency since their handoff already reflected best practices – use of a dedicated room, dedicated time, senior supervisors (residents and attendings) were present, interruptions from nursing were limited, and handoffs were given priority at that time. Shortly after the handoff, we asked post call interns to report what they thought on-call interns would say the most important item of information for a patient was. The key was that we asked post call interns to speculate what the on-call intern would say, and not what they thought. When we asked on-call intern to report what they thought the most important piece of information was, we allowed them to list as many items as they thought were important. Using this technique, pediatric interns were overestimated the effectiveness of their communication. In interviews regarding roughly 80 patients, 40% of the time, the most important piece of information was not communicated. Rationale was often missing, and when present occasionally contradictory. Lastly, there was a retention hierarchy for information. To do items were more likely to be remembered by on-call interns than if/then or knowledge items. Knowledge items were least likely to be remembered.

Handoffs as process
In addition to studying handoff through the lens of communication science, we have also used process mapping to study handoffs from a more systems perspective. This is important since handoffs are affected by the complex system of healthcare that surrounds handoffs. Process mapping is a quality improvement tool that allows frontline personnel to visualize the steps in the process, build consensus, and identify areas for improvement. When process mapping, its important to map the current process, and not the desired process so that changes can be made. At each step in the process, frontline personnel can also identify barriers and facilitators to making each step work well.

Using this approach, we have examined handoffs at 9 residency programs at the University of Chicago. We note that simple things such as not having printer in the paper could undermine updating the handoff. In addition, variability due to competing responsibilities or individual

practice often undermines attempts to standardize practice. For example, while all chief residents stated that verbal communication is required, they also acknowledged that it does not always occur due to residents being in clinic, or in the OR, or that some residents are better than others at making themselves available. Given that the handoff is a transfer of content in addition to a transfer of professional responsibility, we have observed instances where these transfers were separated in time and space. Process maps allowed residents to identify the vulnerabilities and gain buy-in to synchronize these transfers. Lastly, process maps also identified best practices and characteristics of highly functioning teams. For example, in our OR to PACU handoff which is conducted by anesthesia residents to PACU nurses in a fast paced intense environment, we noted that specification of clear roles and the use of backup behaviors allowed for the focus to be patient care. This handoff is orchestrated to ensure that monitors are hooked up in a timely fashion and residents step in to fulfill this responsibility in case nurses are not at the designated bed number when they arrive.

Learning during the handoff to ameliorate uncertainty
One key thing that we have continued to study is that poor handoffs leads to uncertainty in clinical decision making that can undermine care. Uncertainty was one of the most common themes in our study of internal medicine intern end of shift signouts. In a recent study of hospitalist service change, incomplete handoffs were associated with uncertainty in decision making. We have spent some time thinking about how the types of clinical uncertainty that residents face when on-call. Based on the Beresford model of clinical uncertainty, there are several forms – technical (not knowing how to do a procedure), conceptual (not knowing when to transfer a patient to the ICU) or personal (not knowing a patient's preferences). After a handoff, the receiver has a high degree of personal uncertainty regarding patients that are receiving calls about due to lack of prior knowledge. Receivers spend a lot of time recovering information that should be in a handoff. Although an optimal handoff should be a learning moment, it is unclear whether currently designed handoffs can fully ameliorate personal uncertainty. This is an area that we are still exploring in our research.

Teaching & evaluating handoffs
The last key area that we are working in is in developing tools to teach and evaluate handoffs. To teach handoffs, we are using simulation – the OSHE – Observed Simulated Handoff Exercise – which models a handoff by asking trainees to incorporate static critical information (from a history and physical) with dynamic changing information (Interval Events Video with clinical triggers for anticipatory guidance and to do items) into a written and verbal exchange and perform a handoff to a "standardized" resident receiver. Resident receivers use the "Handoff CEX" which we have developed to assess quality of handoffs based on domains derived from existing literature. The Handoff CEX can also be used for real-time assessment of handoffs. In addition, we have developed a competency-based peer-evaluation. These tools can be helpful to residency and student educators to provide valuable feedback. Efforts to validate our tools are underway.

References:
See attached Handoff Bibliography

Interns Overestimate the Effectiveness of Their Hand-off Communication

AUTHORS: Vivian Y. Chang, MD,[a] Vineet M. Arora, MD, MA,[b] Shiri Lev-Ari, MA,[c] Michael D'Arcy, BA,[d] and Boaz Keysar, PhD[c]

[a]Division of Pediatric Hematology/Oncology, University of California, Los Angeles, Los Angeles, California; Departments of [b]Medicine and [c]Psychology, University of Chicago, Chicago, Illinois; and [d]Department of Medical Anthropology, University of California, Berkeley, Berkeley, California

WHAT'S KNOWN ON THIS SUBJECT: Transitions of patient care from 1 physician to another, otherwise known as hand-offs, are riddled with omitted or inaccurate information, leading to near-misses or adverse events. It is unclear why physician communication is so problematic.

WHAT THIS STUDY ADDS: This study found that pediatric residents overestimated the effectiveness of their communication during hand-offs. Theories from the psychology of communication propose that such overestimation is a systematic cause of miscommunication.

abstract

OBJECTIVE: Theories from the psychology of communication may be applicable in understanding why hand-off communication is inherently problematic. The purpose of this study was to assess whether postcall pediatric interns can correctly estimate the patient care information and rationale received by on-call interns during hand-off communication.

METHODS: Pediatric interns at the University of Chicago were interviewed about the hand-off. Postcall interns were asked to predict what on-call interns would report as the important pieces of information communicated during the hand-off about each patient, with accompanying rationale. Postcall interns also guessed on-call interns' rating of how well the hand-offs went. Then, on-call interns were asked to list the most important pieces of information for each patient that postcall interns communicated during the hand-off, with accompanying rationale. On-call interns also rated how well the hand-offs went. Interns had access to written hand-offs during the interviews.

RESULTS: We conducted 52 interviews, which constituted 59% of eligible interviews. Seventy-two patients were discussed. The most important piece of information about a patient was not successfully communicated 60% of the time, despite the postcall intern's believing that it was communicated. Postcall and on-call interns did not agree on the rationales provided for 60% of items. In addition, an item was more likely to be effectively communicated when it was a to-do item (65%) or an item related to anticipatory guidance (69%) compared with a knowledge item (38%). Despite the lack of agreement on content and rationale of information communicated during hand-offs, peer ratings of hand-off quality were high.

CONCLUSIONS: Pediatric interns overestimated the effectiveness of their hand-off communication. Theories from communication psychology suggest that miscommunication is caused by egocentric thought processes and a tendency for the speaker to overestimate the receiver's understanding. This study demonstrates that systematic causes of miscommunication may play a role in hand-off quality. *Pediatrics* 2010;125:491–496

In 2003, the Accreditation Council for Graduate Medical Education restricted residency duty hours in response to increasingly complicated patients, data on the effects of sleep deprivation on residents, and growing media attention on the affects of long duty hours on patient safety and resident well-being.[1] Since then, many voiced concerns about the increased frequency of hand-offs, whereby patient care responsibility is transferred from 1 resident who is leaving the hospital to another resident who will be staying and covering other residents' patients.[2,3] The frequency of hand-offs did in fact increase after the duty hour restrictions, with a member of the primary health care team being present in the hospital for less than half of a patient's hospitalization.[4] This emphasizes the importance of quality hand-offs.

A recent *Pediatrics* article[5] found no significant change in the total hours of work or sleep before and after the duty hour restrictions. It is interesting that the authors found a significant increase in minor errors, which may result from an increase in hand-off frequency without a corresponding increase in hand-off education and improvement. In addition, in December 2008, the Institute of Medicine released recommendations to reduce work hours further and to train residents on transitions of patient care.[6] Implementing these recommendations would further increase the frequency of hand-offs. Thus, undertaking formal hand-off education and improvement activities is becoming increasingly critical to ensuring safe patient care. To develop such programs, it is essential to understand the systemic reasons for hand-off communication failure.

The hand-off process, also known as "sign-out," can be a written or verbal transfer of patient care information. Each time a hand-off occurs, the possi-bility for miscommunication arises. Hand-offs are often riddled with omitted or inaccurate information that could be critical to patient care, such as code status or allergies, resulting in uncertainty in the covering residents' decisions for patients.[7,8] The contribution of communication failures to adverse events has been estimated to be between 15% and 67%.[9–11] To date, little is known about the hand-off process in general and in the field of pediatrics in particular. Although several studies focused on near-misses and adverse events,[7,12,13] they lacked the theoretical foundation to explain why physician-to-physician communication is poor.

Theories from the psychology of communication may be applicable in understanding why hand-off communication is inherently problematic. Studies show that speakers systematically overestimate how well their messages are understood by listeners[14] and that people in general believe that their thoughts are transparent to others.[15–17] In addition, the more knowledge that people share, the worse they communicate new material because they overestimate the knowledge of the other.[18] These psychological processes could systematically affect the effectiveness of communication during hand-offs. The aim of this study was to assess whether postcall pediatric interns who provide hand-offs can correctly estimate the information received by on-call interns at a hand-off communication.

METHODS

Participant Population

All interns, subinterns, and visiting interns who were rotating on the general pediatrics team at the University of Chicago Comer Children's Hospital were eligible for the study. During June 2007, the study protocol was explained by pediatric resident and investigator (Dr Chang), and written con-sents were obtained. Participation was voluntary, and the institutional review board at the University of Chicago approved this study.
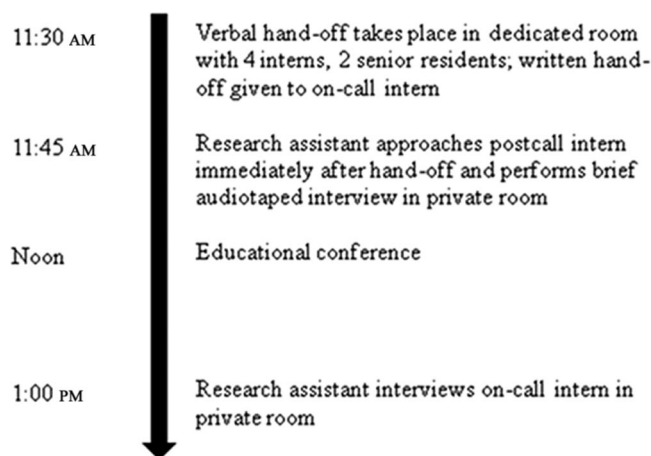
Study Setting

At the University of Chicago, there is 1 general pediatrics team that is composed of 1 attending, 2 senior residents (postgraduate year 3) who provide day coverage from 7 AM until 7 PM, 2 senior residents (postgraduate year 2 or 3) who provide night coverage from 7 PM until 7 AM, and 4 interns (postgraduate year 1). Interns rotate through general pediatrics for 1.5 to 2.0 months. One intern is on call each night and works 30-hour shifts every 4 days. The on-call intern admits general pediatric patients from 7 AM to 7 AM the next day. The verbal hand-off occurs at 11:30 AM daily in a dedicated conference room with the postcall intern communicating primarily to the on-call intern but with the other interns and senior residents also present. Senior residents are present in the room mainly to play a supervisory role and could interject if necessary. The attending is not present. The computerized written hand-off is a Microsoft Word document (Redmond, WA) updated by the postcall intern and given to the on-call intern.

Data Collection

Participant Recruitment

Interns were interviewed on the last 4 weekdays of their general pediatrics rotation. This allowed interns to establish their own hand-off practice patterns, minimizing the potential for the interview to act as an intervention, or the Hawthorne Effect.[19]

On-call and postcall interns were approached after the hand-off and asked to participate in an interview about the hand-off communication. The postcall intern was interviewed immediately after the handoff, allowing that intern to

leave the hospital within duty hour restrictions. The on-call intern was interviewed after a noon conference, at 1:00 PM (Fig 1). The interns had access to the written hand-off during the interview, which took place in a private room and was audiotaped. All interviews were conducted by trained research assistants (Ms Lev-Ari and Mr D'Arcy).

Postcall Interview Script

The interviewer asked the postcall interns to identify patients by room number to protect health information. They were told that the on-call intern will be asked to describe the most important pieces of information for each patient that was communicated during the hand-off and then asked to rank the information in order of importance (Table 1). The interviewer also explained that the on-call intern will be asked to report any rationale that he or she received for each item. The interviewer then asked the postcall interns to detail how they expect the on-call intern to answer these questions. This provided an estimate of what the postcall intern believed that the on-call intern received from the hand-off session.

The postcall intern was then asked to guess the on-call intern's rating of how well the hand-off prepared him or her to take care of the patients, on a scale from 1 to 10, with 1 being "did not prepare me at all" and 10 being "prepared me very well." Finally, the postcall intern guessed the on-call intern's rating of how well the hand-off went in general, on a scale from 1 to 10, 1 being "badly" and 10 being "very well."

On-call Interview Script

The interviewer referred to patients by the room numbers provided by the postcall intern. The interviewer asked the on-call intern to list the most important pieces of information, along with any rationale, about each patient that the postcall intern discussed during the hand-off and then to rank this information in order of importance. These questions were repeated for each patient. This provided an estimate of what the on-call intern actually received from the handoff session. Then, the on-call interns rated how well the hand-off prepared them to take care of the patients overnight and how well the hand-off went in general, both on a scale from 1 to 10.

Data Analysis

Audiotaped interviews were transcribed by Voss Transcription, Inc (Chicago, IL), and reviewed by 2 physician investigators (Drs Chang and Arora) for accuracy. Occasionally, when transcripts had missing information, the original audiotapes were consulted by

TABLE 1 Interview Script

Postcall Intern	On-call Intern
We will ask the on-call physician to report what information he or she received about this patient, as well as the rationale you provided for each piece of information. We will ask him or her to list the pieces of information, starting with the most important information. We would like to ask you to guess how he or she answered, starting with the most important piece of information.	Could you please tell me what information you received about this patient? For each piece of information, please include the rationale that the primary physician provided when possible. Please list the pieces of information in order of importance, starting with the most important information.
We will ask the on-call physician to rate how well the sign-out went, with 1 being "badly" and 10 being "very well." Could you guess his or her rating, and can you please explain your answer?	Could you rate how well you feel the sign-out went, with 1 being "badly" and 10 being "very well"? Could you please explain your rating?
We will ask the on-call physician to rate how well the sign-out prepared him or her to take care of these patients, with 1 being "did not prepare me at all" and 10 being "it prepared me very well." Could you guess his or her rating, and can you briefly explain your answer?	Could you rate how well you feel the sign-out prepared you to take care of these patients, with 1 being "did not prepare me at all" and 10 being "it prepared me very well"? Could you briefly explain your rating?

Postcall interns were asked to guess the on-call interns' responses to interview questions. On-call interns were asked to list the important items communicated during the hand-off about each patient and accompanying rationale. They rated how well the hand-off went and how well-prepared they felt to take care of patients overnight.

physician investigators (Drs Chang and Arora) and blanks were filled in when possible. For example, "sickledex" was inaudible to transcribers, but given the investigators' knowledge of the hospital's qualitative screen for sickle hemoglobin, the missing name for the laboratory test was filled in.

Transcripts were stripped of identifiers. Postcall and on-call transcripts for the same hand-off were paired. For each patient, data were extracted into a Microsoft Excel spreadsheet, and important items that the postcall and on-call interns reported were juxtaposed. The items were then coded for agreement between the interns, with 1 being "agreement" and 0 being "no agreement." To qualify as agreement, the item had to match in meaning, not necessarily in terminology. We then compared the rationale that the postcall intern expected the on-call intern to report with the rationale that the on-call intern actually reported. Last, we coded items with respect to importance: (1) the most important item about each patient and (2) the top 3 important items regardless of priority rank. The coding was initially conducted by 1 investigator (Dr Chang) and then reviewed by a second investigator (Dr Arora).

We used summary statistics to tabulate the mean agreement on the most important items about each patient, how well the hand-off prepared the on-call intern to take care of patients, and how well the overall hand-off went. We conducted subgroup analyses by using χ^2 tests for type of intern and type of item being communicated. All statistical tests were performed by using Stata 10.0 (College Station, TX), with statistical significance defined as $P < .05$.

RESULTS

All 18 categorical pediatric interns and 5 combined medicine-pediatric interns (100%) agreed to participate in the

study from July 2007 to May 2008. Ten of 28 visiting interns (family medicine interns rotating from other hospitals) or subinterns (fourth-year medical students from the study institution) also agreed to participate. We conducted 52 interviews, which constituted 59% of eligible interviewees. Of the 52 interviews, there were 19 dyad interviews, consisting of both the postcall and the on-call interns of the same hand-off. The majority of interviews that were included in the analysis were from categorical pediatric interns (63%). Sixteen percent of the analyzed interviews were from medicine-pediatric interns, 18% were from rotating interns, and only 1 was from a subintern (<2%). Fourteen interviews were discarded because only 1 of the 2 interns was interviewed and therefore could not be paired. Seventy-two patients were discussed during the interviews that were analyzed.

Postcall interns overestimated the effectiveness of their communication. For example, 1 postcall intern expected the on-call intern to have understood the following about a patient:

1. "Follow-up on surgery's recommendations."

2. "Postop, restart patient on feeds and if that improves, stop [intravenous] fluids."

3. "Patient will stay on [intravenous] antibiotics today and will go by mouth tomorrow."

In contrast, the on-call intern actually understood:

1. "Coming back from surgery, so restart feeds."

2. "I might get a page from [affiliated hospital] and I'll just defer to primary physician."

This on-call intern mentioned only 1 of the 3 items that the postcall intern expected. This discrepancy was very common. On average, postcall interns expected on-call interns to mention 2.6

important items per patient, whereas on-call interns actually mentioned only 1.6 items on average ($P < .01$). For 69% of the patients, the on-call intern failed to note at least 1 of the important items that the postcall intern expected him or her to note.

We also looked at how interns ranked the items about each patient, in order of importance, as a measure of how well the gravity of each item was communicated. The postcall interns overestimated their ability to convey the information about the importance of each item. Overall, the item that postcall interns expected on-call interns to perceive as the most important was not perceived as such by the on-call interns for 60% of the patients. In fact, the most important item about a patient was not mentioned at all by the on-call intern for 40% of the patients.

We conducted subset analyses comparing categorical pediatric interns, combined medicine-pediatric interns, and rotating family medicine interns. There was no difference between categorical pediatric interns and combined medicine-pediatric interns in the percentage of items that were successfully communicated during the hand-off; however, when the postcall intern was a rotating family medicine intern, there was a significantly lower likelihood that the most important item about a patient was communicated (odds ratio: 0.16 [95% confidence interval: 0.04−0.75]; $P = .02$). In addition, the percentage of overall agreement was significantly lower compared with pediatric interns (95% confidence interval: 9.1%−49.0%; $P = .005$). There was no change in effective hand-off communication between the interns, with experience over time during their internship (using indicator variables representing 2- or 3-month intervals).

In addition, we categorized each important item by type: to-do, anticipa-

tory guidance (if, then), and knowledge. We performed χ^2 tests and found a statistically significant difference in the likelihood that an item would be effectively communicated when it was a to-do item (65%) or an item related to anticipatory guidance (69%) compared with knowledge items (38%; $P =$ .003). The number of patients discussed during each hand-off ranged between 3 and 5, with an average of 3.8. We compared the effectiveness of hand-off communication between postcall interns who had fewer than the average number of patients (3 patients) and postcall interns who had more than the average (4 or 5 patients) and found no relationship between the number of hand-off patients and the agreement between the interns on the most important item about a patient (60% vs 55%; P = .57).

Postcall interns also overestimated the extent to which on-call interns appreciated the rationale behind the information. When the postcall intern provided a rationale, the on-call intern failed to mention that rationale 60% of the time. In some cases, postcall and on-call interns even provided very different rationales. For example, a postcall intern expected the on-call intern to say that the rationale behind "follow-up with case manager" was to "make sure she talked with patient's [primary medical doctor]," but the on-call intern actually reported the rationale as "to ensure nothing holding up discharge."

The average rating of how well prepared the on-call intern felt to take care of patients after the hand-off was 8.8 of 10.0 (SD: 1.0), and the postcall intern reported an average of 8.0 of 10.0 (SD: 1.0). The overall rating of hand-off was 8.3 (SD: 1.3) by the on-call intern and 7.6 (SD: 1.1) by the postcall intern.

DISCUSSION

This study found that pediatric interns overestimate the effectiveness of their hand-off communication, despite their failure to convey the most important information about a patient 40% of the time. This study ties in theories from communication psychology as a possible explanation for why hand-off communication is so poor. In that light, resident miscommunication is the result of a complex interplay among various factors. Because speakers know what they are trying to convey, they tend to think that what they say is clear to anyone.[20] Moreover, because they overestimate how well they communicated, postcall interns are less likely to verify whether the on-call intern actually understood[14,21]; therefore, the inability of the postcall intern to gauge accurately the on-call intern's understanding of patient information may greatly affect hand-off quality; not only are on-call interns failing to receive important patient information, but also the postcall interns are systematically failing to realize that breakdown of communication. These communication breakdowns occurred even with written hand-offs.

It is interesting that there was no change in effective communication over time. This could mean that increasing clinical knowledge and experience alone do not affect an intern's ability to communicate effectively during hand-offs. Because there is no formal hand-off curriculum, this suggests that senior residents would not be much better than the interns. It is important to recognize that the literature has found that hand-offs in most residency programs are executed by interns alone with little supervision by senior residents or attendings.[4] Our findings suggest that even with the presence of a senior resident, postcall interns still overestimate the effectiveness of their hand-off communication.

One possibility for the finding that to-do and anticipatory guidance items were more likely to be communicated compared with knowledge items is that they refer to high-priority items that are relevant for the on-call intern's upcoming shift. In contrast, items related to knowledge may be less urgent and therefore not as likely to be remembered by the on-call intern. This is in concordance with a review by the National Aeronautics and Space Administration, where hand-off communication has been found to be most effective when it is driven by "problems, hypotheses, and intent" rather than long lists.[22] It seems reasonable to train interns to communicate by using this framework and avoid unnecessary knowledge items that are unlikely to be remembered. This will prevent cognitive overload for on-call interns by tailoring information that is communicated. This is an area that requires additional studies.

There are several limitations to this study. It is a single-institution study with a small number of interns, making its generalizability unknown. It is also unclear whether our findings are generalizable to more senior residents and hand-offs in other subspecialties, yet it is reasonable to assume that our findings underestimate the extent of the problem. Hand-offs in our pediatric residency program receive high priority; they occur in a dedicated room and time, have both verbal and written information, and are supervised by senior residents. Despite such good conditions, we found overestimation of hand-off effectiveness by postcall interns. Although there is no survey of hand-off practices in pediatric residency programs, it is known that hand-offs in internal medicine do not always take place in such ideal setups[4]; therefore, a multisite study is likely to find more overestimation and miscommunication.

Unfortunately, some interviews were not conducted because either the postcall or the on-call intern was unavailable. Mainly postcall interns were unable to participate in interviews because they either did not answer a page as a result of workload or left the hospital to adhere to duty hour restrictions. There is no reason to believe that the excluded dyads had more effective hand-offs. If anything, given that the excluded dyads seemed to be under increased pressure, their hand-offs might have been even less effective.

CONCLUSIONS

This study shows that postcall interns overestimate the patient information that they convey in hand-offs, and it highlights the extent to which pediatric interns do not agree on the content, priority, or rationale communicated during hand-offs. In the era of restricted duty hours and increased frequency of hand-offs, it is important for educators to consider the role of systematic causes of miscommunication. Future studies should include hand-off improvement efforts, such as the development of specific hand-

off curricula[23] to include emphasis on important items, rationale, and a tailoring of information.[24] At the very least, postcall interns should be aware of their "illusion of transparency." They should appreciate that much of the important information that they thought they conveyed during the hand-off was never really received by the on-call intern.

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Care Transitions for Hospitalized Patients

Vineet M. Arora, MD, MA[a],*, Jeanne M. Farnan, MD[b]

[a]Department of Medicine, University of Chicago, 5841 South Maryland Avenue, MC 2007, AMB W216, Chicago, IL 60637, USA
[b]Department of Medicine, University of Chicago, 5841 South Maryland Avenue, MC 2007, AMB B226A, Chicago, IL 60637, USA

The development of safe care transitions has grown in importance with shortened hospital lengths of stay and with discontinuity of care related to multiple clinicians and hand-offs of care responsibility. These transitions can have detrimental effects on the quality and safety of health care delivery. Patients and their families entering the realm of inpatient care may be surprised by the rapid pace of care delivery and confused about the membership of the health care team that increasingly does not include a patient's primary care physician. Similarly, when patients leave the acute-care hospital and are discharged to an ambulatory setting or other facility, patients, their caregivers, and their ambulatory physicians may not be aware of new diagnoses or changes to their treatment plan, such as new or changed medications. These transitions become especially difficult for patients who have complex comorbidities, advanced age, and low health literacy.

The transition from inpatient hospitalization to outpatient care is not the only transition that plagues the care of hospitalized patients. In-hospital care also is characterized by many transitions between providers to ensure around-the-clock coverage by hospital-based physicians. This process, often known as the hand-off, is complicated further in academic teaching hospitals because of resident work-hour regulations. Often, competing priorities and time constraints can hamper an effective hand-off, potentially resulting in failures of communication, such as content omissions, which can have a negative impact on patient care [1]. It is during these times of transition, admission, hospitalization, and discharge that patients' vulnerability is

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revealed and patient safety may be compromised. This article discusses the types of care transitions that hospitalized patients face, the importance of effective communication among providers to ensure patient safety, and strategies to promote safe and high-quality care transitions.

Barriers to inpatient-outpatient transitions

Patients experience many transitions and hand-offs as they navigate an increasingly complex health care system. Physician specialization, patient complexity, and the distributed nature of health care services have created a need for additional communication and coordination of care. With the increasing number of hospitalists in this country, physicians who care for patients during hospitalization often are not patients' primary care physicians. As a result, no single physician supervises the transition from outpatient to inpatient care and back again. Therefore, effective communication and coordination is important particularly at times of inpatient-outpatient transition, such as admission to and discharge from the hospital, and during major decision points within the hospital course [1–3].

Although it generally is agreed that effective communication is essential to safe patient care, health care providers continue to be challenged to design communication strategies that are consistent and reliable. As a result, communication issues frequently are cited as major contributors to adverse events. The Joint Commission [4] reports communication failures as the root cause of more than 70% of sentinel events. Not surprisingly, because of the complexity and volume of the interventions performed in the inpatient setting, communication failures can be major threats to ensuring patient safety during transitions from an inpatient to outpatient setting.

One of the primary goals of a hospital medicine program is to deliver quality inpatient care to patients who are hospitalized for an acute complaint. The success of a hospital care plan, however, is dependent on critical communication between a hospital-based physician and a patient's primary care physician [5]. Ensuring that a patient's hospital course and treatment, addition of new medications, and follow-up planning are relayed to a primary care physician establishes continuity of care between the inpatient and outpatient arenas. This is important particularly because primary care physicians often wish to remain involved in patients hospital care but lack the systems within which to interact effectively with a hospital care team [6].

Effective communication of information is important particularly to prevent gaps in clinical knowledge that may occur during transition into and out of the hospital. More specifically, lack of a structured approach to relaying information during admission and discharge and absence of reliable systems to ensure the transmission of such information can prevent the delivery of vital information to those assuming care of a patient. For example, in one study, medication issues at the time of hospital admission

were a common source of error, with more than 40% of patients having an omission of a regularly used medication [7]. Approximately 38% of discrepancies were judged to be serious or have the potential to cause moderate to severe harm. Similar problems occur during discharge. In addition to medication problems, many patients are discharged from hospitals with test results pending, and physicians often are unaware of potentially actionable test results returning after discharge [8]. These problems reflect the need for systems-level solutions to track information and help facilitate communication during these transition points.

The growth of the hospitalist model in the context of management of older, sicker patients who have more comorbidities and therapies suggests that efforts to address inpatient-ambulatory transitions will become increasingly important [5]. Preliminary survey work with primary care physicians indicates that the majority believe hospitalists are a good idea (68%), but only 56% were satisfied with communication with hospitalists and only one third believed that they had received discharge summaries in a timely fashion that facilitated safe and effective management of patients on return to their practice [6]. The increasing use of hospitalists heralds the need for improved skills and competencies in the care of hospitalized patients and the transit of patients from the ambulatory setting into and throughout their hospitalization until discharge. Recognizing this, the Society of Hospital Medicine has included care transitions as critical to the core competencies for hospitalists [9]. Hospitalists also must demonstrate the ability to communicate effectively with patients and collaborating physicians, most importantly patients' primary care physicians.

Transitions of care at admission and discharge are fraught with fragmented and incomplete information transfer and represent points of patient vulnerability. Several factors that contribute to the risks of these care transitions include inefficient and unstructured systems for communication of important clinical data, such as medication changes or tests that are pending; lack of a longitudinal patient relationship; and standardized follow-up procedures. The infrequency of hospitalist-primary care physician communication and omission of details of patients' hospital course have further adverse impacts on patient care [10].

Strategies to improve inpatient–outpatient transitions

There are several strategies that may be used to counteract many common barriers to the delivery of coordinated patient care (Table 1). Ensuring that a patient's hospital course and treatment and information about any medication changes and specific follow-up needs are relayed to the primary care physician establishes continuity of care between the inpatient and outpatient arenas. The maintenance of open lines of communication between inpatient and outpatient physicians should occur at several points within

Table 1
Inpatient-outpatient transitions

Transition	Participants	Barriers	Successful strategies
Admission (outpatient to inpatient)	Admitting physicians (emergency department, PCP)	Perception of PCPs' suggestions as "intrusive"; PCP assuming managerial role in plan of care	Formal system for communication between PCP and hospital physician
	Inpatient physicians (nocturnists, other hospitalists, house staff)	Inpatient physicians' lack of personal and longitudinal relationship with patient	Patient empowerment or other adjunct transition coach
Discharge (inpatient to outpatient)	Home health service organizations/ professionals, including nurses, physical therapists	Timely transmission of accurate information related to the hospitalization	Process for medication reconciliation during transitions
	Primary care physician Hospitalist Family/primary caregivers	Involving PCP only at discharge without relaying information during hospitalization	System for follow-up of tests and other laboratory results that may be pending

a patient's hospital course, including admission, discharge, and times of critical decision making or major change in status during a hospitalization. This collaborative approach allows inpatient physicians to relay the trajectory of the hospital course as opposed to a single snapshot at the moment of discharge. In addition, the established relationship between patients and their primary care physicians may inform critical decisions to be made by the inpatient team and facilitate patient-centered care [11].

Initiatives that involve patients in their own care during the inpatient to outpatient transition show improved outcomes [12]. Coleman and colleagues [12] demonstrated lower readmission rates and lower hospital costs for older patients who received a "care transitions intervention," which encouraged patients to take a more active role in their care and provided tools and guidance from a "transition coach" to promote communication across transitions.

The use of a standardized approach to medication reconciliation or ensuring the appropriate addition, continuation, and discontinuation of medications from the inpatient to ambulatory transition can be an important strategy to facilitate communication regarding medication changes with patients' primary care physicians and with patients. When patients move from one setting to another, medication reconciliation ensures that an accurate, up-to-date list of medications is maintained and consistent with the plan of care. Not surprisingly, medication reconciliation is the subject of the 2005 National Patient Safety Goal from the Joint Commission [13]. The Institute of Healthcare Improvement, as part of its 100,000 Lives

Campaign, and the Massachusetts Coalition for the Prevention of Medical Errors have developed tools to assist in the medication reconciliation process [13,14].

Finally, as patients are discharged and returned to the care of their ambulatory physician, accurate and complete communication of a patient's hospital course, medication changes, and required follow-up are essential for maintaining continuity of care. Successful strategies for improving the coordination of care during this transition include standardizing the type of content that is relayed to primary care physicians via a specific content checklist [15] or via computerized documentation of patients' hospital stay and follow-up [10]. The Society of Hospital Medicine has developed a discharge checklist that can be used for this purpose [1]. In addition, the implementation of a postdischarge clinic, one structured for interim visits after hospital discharge should patients be unable to obtain timely visits with a primary care physician, are effective in reducing postdischarge emergency department visits [16].

Barriers to in-hospital hand-offs

An increased focus on the vulnerability of in-hospital transitions or patient hand-offs has occurred for a variety of reasons. These include implementation of restricted resident duty hours by the Accreditation Council of Graduate Medical Education [17] and the demand for in-hospital 24-hour coverage by various groups, such as Leapfrog Group. Poor communication at the time of hand-offs is implicated in near misses and adverse events in a variety of health care contexts, including nursing hand-over, physician sign-out of patients, and emergency medicine shift changes [18,19]. Despite the increased focus on the vulnerability of hand-offs, few medical trainees or hospitalists receive formal education on how to perform effective hand-offs.

Two types of in-hospital transition occur: shift change and service change (Table 2). Shift change involves the temporary change in responsibility as a primary provider or team transfers care to an evening or night shift. Patients often are moved from an active period of therapeutic management to a "holding phase" until the return of the regular provider or clinical team [20]. Physicians accepting a hand-off have a mandate to deal with emergencies, but planning, communication of care plans to patients and families, and nonurgent diagnostic testing usually are suspended.

Service change involves a more long-term change in responsibility, in which a physician or team of providers who has been caring for a group of patients for an extended period, usually a week or greater, changes, such that a new physician or team of providers assumes control of patient care. This service hand-off, unlike the shift change that anticipates potential overnight emergencies, involves the relay of a patients' acute needs for hospitalization, the hospital course to date, current health status, and overall continued plan of care. Often used synonymously with hand-off, sign-out

Table 2
In-hospital transitions

Transition	Participants	Barriers	Successful strategies
Shift change	Hospitalist/attending physician Midlevel clinician Nocturnist (night-covering physician) House staff	Competing time pressures, distractions, and interruptions leading to ineffective hand-off of patient information, resulting in breakdowns of communication (ie, omissions), lack of professional responsibility	Ensure verbal (preferably face-to-face) exchange with interactive questioning and limited interruptions Standard template or technology solution to facilitate accurate and up-to-date information
Service change	Hospitalist/attending physician Midlevel clinician House staff	Lack of continued interaction with patient and feedback, snapshot of patient's entire hospital course, competing time pressures	Use of structured language (ie, read-back or SBAR) Creation of standard hand-off protocol (process map and customized checklist) Training for frontline users

can refer to the written vehicle (eg, document or electronic file), the transfer of patient information during a hand-off, or the verbal communication that takes place at the time of any of these hand-offs [21].

Shift and service changes represent transitions within patients' hospital course in which the transfer of patient care responsibility may contribute to near-miss or adverse events. The shift change occurs more frequently, usually on a nightly basis, and the potential for harm frequently revolves around the lack of a personal relationship between covering physicians and patients and the resulting absence of the acknowledgment of professional responsibility. Covering physicians are expected to be prepared to manage patient emergencies that may arise; however, detailed information about patients and all facets of their medical history often is omitted. As such, these covering physicians often are equipped to manage critical illness but not the nuances of patients' chronic medical illnesses.

Unfortunately, the barriers present in this transition include accepting physicians' limited knowledge of the service of patients, which includes the lack of an a priori personal relationship with patients and entry into the care plan during a potentially difficult time. It also is possible that outgoing physicians, or those who have completed their required service time, no longer may be invested in the ongoing care of this group of patients, especially those who have been passed from physician to physician in multiple service changes.

Several studies have demonstrated that ineffective physician-physician hand-offs during shift change can harm patients. Arora and colleagues [1] have used critical incident technique to interview internal medicine interns regarding communication failures during the verbal and written sign-out of patients. They found that communication failures during patient sign-out are characterized by omissions of content or failure-prone communication processes, which often lead to uncertainty in patient care decisions, resulting in unnecessary or repeat work. In addition, Solet and colleagues [3] reviewed the hand-offs at three Indiana hospitals and identified common reasons for poor information transmittal. These included noisy, distracting physical settings that impede conversation; the hierarchic nature of medicine (which can discourage open discussion between health professionals); language barriers among doctors; lack of face-to-face communication; and time pressures. To date, no controlled interventions evaluating the effect of a service change or shift change on patient outcomes have been performed. In one observational study, patients were more likely to suffer from a preventable adverse event (26% compared with 12% [odds ratio 3.5; $P = .01$]) when the cross-covering physician (not a physician on their primary team) was responsible for their care [22].

Often hospitalists work schedules of 8- to 12-hour shifts, which involve transfer of care between physicians, as individuals completing their shift relay the plan of care to those reporting for duty. Ensuring that pertinent and accurate information, including medications and their dosages, plans for diagnostic testing, and code status, is transmitted to these covering physicians improves the quality of care delivered. Often, competing priorities and time constraints can hamper an effective hand-off, potentially resulting in failures of communication, such as content omissions, which can have a negative impact on patient care [1]. An effective hand-off includes the transfer of critical patient information needed to continue care for a patient and the acceptance of the professional responsibility of continued care for a patient [23].

Strategies to improve in-hospital hand-offs

In the effort to improve in-hospital transitions, it is important to review the effect of interventions targeted at these hand-offs. Unfortunately, unlike inpatient-outpatient transitions, fewer controlled interventions exist to guide improvements in inpatient transitions. Nevertheless, the Joint Commission has made standardized hand-off communications the subject of a 2006 National Patient Safety Goal [2]. The goal requires hospitals to "implement a standardized approach to hand-off communications, including an opportunity to ask and respond to questions." The implementation expectations are focused on a hand-off process that is interactive, allows for the communication of up-to-date information that includes recent changes and

anticipated events, facilitates verification or read-back as appropriate, and contains minimal interruptions. Support for these goals is found in reviewing the standards for hand-offs developed by other high-risk non–health care industries.

Patterson and colleagues [24] have conducted direct observations of hand-offs in other 24-hour, high-risk industries, such as aviation, transportation, and nuclear power. From this work, they derived as series of effective strategies that could be applied to health care. The use of standardization and a face-to-face verbal update with interactive questioning emerged as a key strategies from these observations. In addition, use of a written summary, access to updated information, limited interruptions, and the unambiguous transfer of professional responsibility were cited as key components of an effective and safe hand-off strategy.

The situational briefing model (*S*ituation, *B*ackground, *A*ssessment, *R*ecommendation [SBAR]) is a technique that originated in the Navy to communicate critical content. This model has been used by Leonard and colleagues [25] to improve nurse communication of critical information to physicians. More recently, hospitals have been adopting the SBAR model as a way to meet the Joint Commission goal for standardized hand-offs for physician-physician communication and nursing shift change [26]. SBAR includes the activity of reading back the information or specific instruction. During requested read-back of 822 laboratory results, it reduced the number of errors [27]: in addition to detection and correction of all 29 errors, use of a read-back was cost effective. Although it has been adopted widely, it is important that the SBAR model be customized for frontline users.

Structured templates, in particular computer-aided sign-outs, have been used at several institutions with success. Van Eaton and colleagues [28] implemented and studied the University of Washington homegrown electronic sign-out system, known as UW Computerized Rounding and Sign-out (UW Cores). This system enhances patient care by decreasing patients missed on resident rounds and improving resident-reported quality of sign-out and continuity of care. Some outcomes of its use include a decrease—by up to 3 hours per week (range 1.5 to 3 hours)—in the time used by residents to complete rounds and a decrease in time spent recopying data during prerounding. Petersen and colleagues [29] demonstrated a trend toward a reduction of preventable adverse events after the implementation of a computerized sign-out system. Lee and colleagues [30] demonstrated in a randomized controlled trial that a standard sign-out card with set fields resulted in higher quality sign-outs with improved data recording.

In addition to strategies to improve communication during in-hospital transitions, formal training is needed. Horwitz and colleagues [31] in a national mail survey to chief residents in internal medicine demonstrated that most programs do not have formal education for sign-outs. Given the focus on meeting the Joint Commission goal, formal training for frontline

clinicians in the use of standard hand-off protocols is a priority. Creating hand-off process maps and customized checklists can facilitate the creation and implementation of a standard hand-off protocol [23]. These documents then can be used to educate new users and obtain buy-in about the hand-off protocol. Finally, any sign-out or hand-off program must include an evaluation strategy to determine its effectiveness and help shape future changes or revisions to training or the hand-off process itself.

Summary

Ensuring safe care transitions is a core part of hospital medicine. These transitions include inpatient-outpatient transitions and in-hospital transitions. To ensure safe care during these transitions, clinicians should be aware of the types of transitions and the way in which these transitions can impede safe patient care. With this knowledge, strategies to ensure patient safety during care transitions can be adopted, and training directed at teaching physicians safe hand-off practices could be developed and supported.

Acknowledgments

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National Patient Safety Goals

A Model for Building a Standardized Hand-off Protocol

Vineet Arora, M.D., M.A.
Julie Johnson, M.S.P.H., Ph.D.

Department Editors:
Marcia M. Piotrowski, R.N., M.S., Peter Angood, M.D., Paula Griswold, M.S., Gina Pugliese, R.N., M.S., Sanjay Saint, M.D., M.P.H., Susan E. Sheridan, M.I.M., M.B.A., Kaveh G. Shojania, M.D. Readers may submit National Patient Safety Goals inquiries and submissions to Steven Berman (sberman@jcaho.org) and Marcia Piotrowski (marcia.piotrowski@med.va.gov).

I n July 2003, the Accreditation Council for Graduate Medical Education (ACGME) set limits for resident duty hours.[1] Although the main driving force was to reduce sleep deprivation and improve patient safety, one unintended consequence was the increase in the number of handoffs during patient care. The discontinuity of care that thereby results has the potential to undermine the beneficial effects of work hour limitations.[2] The safety of the hand-off process has been called into question by a number of different sources and studies which suggest that handoffs are often characterized by communication failures and environmental barriers.[3–6]

The handoff is also the subject of a Joint Commission on Accreditation of Healthcare Organizations National Patient Safety Goal, which went into effect January 1, 2006. Written as a new requirement of Goal 2, Improve the Effectiveness of Communication Among Caregivers, this addition requires hospitals to implement a standardized approach to hand-off communications and provide an opportunity for staff to ask and respond to questions about a patient's care[6,7] (Sidebar 1, page 647). Although the standard applies to all handoffs that occur between all personnel within all health care settings, the focus of this article is on the handoffs between residency trainees at academic teaching hospitals. Because medical trainees receive little to no formal training or education in communication during handoffs, there is an inherent opportunity to influence the practice of

Article-at-a-Glance

Background: The Joint Commission has made a "standardized approach to hand-off communications" a National Patient Safety Goal.

Method: An interactive 90-minute workshop (hand-off clinic) was developed in 2005 to (1) develop a standardized process for the handoff, (2) create a checklist of critical patient content, and (3) plan for dissemination and training.

Conclusion: To date, 7 of 10 residency programs have participated. Analysis of these protocols demonstrated that the hand-off process is highly variable and discipline-specific. Although all disciplines required a verbal handoff, because of competing demands, verbal communication did not always occur. In some cases, the transfer of professional responsibility was separated in time and space from the transfer of information. For example, in two cases, patient tasks were assigned to other team members to facilitate timely departure of a postcall resident (to meet resident duty-hour restrictions), but results were not formally communicated to anyone. The hand-off clinic facilitated the incorporation of "closed-loop" communication by requiring that follow-up on these tasks be conveyed to the on-call resident.

Discussion: This model for design and implementation can be applied to other health care settings.

Sidebar 1. Joint Commission National Patient Safety Goal 2: Improve the Effectiveness of Communication Among Caregivers

Requirement 2E

Implement a standardized approach to "hand-off" communications, including an opportunity to ask and respond to questions.

Rationale for Requirement 2E

The primary objective of a "hand off" is to provide accurate information about a patient's care, treatment, and services, current condition and any recent or anticipated changes. The information communicated during a hand off must be accurate in order to meet patient safety goals. In health care there are numerous types of patient hand offs, including but not limited to nursing shift changes, physicians transferring complete responsibility for a patient, physicians transferring on-call responsibility, temporary responsibility for staff leaving the unit for a short time, anesthesiologist report to post-anesthesia recovery room nurse, nursing and physician hand off from the emergency department to inpatient units, different hospitals, nursing homes and home health care, critical laboratory and radiology results sent to physician offices.

Implementation Expectations for Requirement 2E

1. The organization's process for effective "hand off" communication includes: Interactive communications allowing for the opportunity for questioning between the giver and receiver of patient information.

2. The organization's process for effective "hand off" communication includes: Up-to-date information regarding the patient's care, treatment and services, condition and any recent or anticipated changes.

3. The organization's process for effective "hand off" communication includes: A process for verification of the received information, including repeat-back or read-back, as appropriate.

4. The organization's process for effective "hand off" communication includes: An opportunity for the receiver of the hand off information to review relevant patient historical data, which may include previous care, treatment and services.

5. Interruptions during hand offs are limited to minimize the possibility that information would fail to be conveyed or would be forgotten

Source: Joint Commission on Accreditation of Healthcare Organizations: *2007 National Patient Safety Goals Hospital Version Manual Chapter, including Implementation Expectations.* http://www.jointcommission.org/PatientSafety/NationalPatientSafetyGoals/07_hap_cah_npsgs.htm (last accessed Sep. 5, 2006).

future physicians.[8] In addition, as academic teaching hospitals continue to adopt systems to ensure that duty-hour restrictions are met, an increased focus on the integrity of the handoffs is crucial to patient safety during these times of transition.

Although relatively little information about educational initiatives exist in the medical literature to guide resident and staff hospital physicians in meeting these standards, much can be learned from other high-risk industries that have been engaged in studying and improving handoffs. From direct observations at the National Aeronautics and Space Agency, nuclear power plants, and transportation dispatch centers, a framework of strategies for handoffs has emerged.[9] Certain strategies, such as standardization and face-to-face verbal update with interactive questioning, resonate directly with the hand-off requirement and are supported by

evidence and expert opinion as best practices associated with improved hand-off comunication.[5,7,10] Drawing on this literature, as well as preliminary data, we present a model for building a standardized hand-off protocol to meet this National Patient Safety Goal. We also review our preliminary experience with the protocol at the University of Chicago.

Creating a Model for Standardized Handoffs

The handoff can be thought of as a communication of information (content) that can take place through different modalities, which can include a written or verbal component. Two guiding principles underlie this model. First, the standardized protocol for handoffs needs to be tailored to discipline and organization. That is, recognize that what works in one discipline may not work in

Table 1. Model for Adoption of a Standardized Handoff

1. Process
   Create a process map.
2. Content
   Create a standard check-list.
3. Implementation
   Garner leadership and resident buy-in.
4. Monitoring
   Ensure the protocol is in place and identify and resolve barriers.

another, given each discipline's unique requirements. Furthermore, what constitutes an effective handoff for one discipline may be different for the same discipline in another organization. Although certain components may be generalizable, the successful adoption of a standardized hand-off protocol is highly dependent on the degree to which it is tailored for end users in an organizational setting. It is the method by which you create the protocol—and the method that is presented here—that is generalizable across disciplines and organizations.

Second, standardization is the core goal for both hand-off process and content. For example, although an identifiable safe protocol may be currently in use for the majority of handoffs in a certain discipline and organization, it is the variability of the hand-off protocol that is the target for improvement. The four steps in our model are outlined in Table 1 (above) and discussed in detail below.

Develop a Standardized Process

"The first step is to draw a flow diagram. Then everyone understands what his job is. If people do not see the process, they cannot improve it." — W.E. Deming

Understanding handoffs as a process is important because a high degree of process awareness often drives the design of the work. By mapping the process, the members of the team can gain insight into how their colleagues perceive the same tasks. Ultimately, systems improvement requires (1) appreciating the inherent link between process and results and (2) identifying potential areas for improvement with a focus on the system that is

producing the processes and outcomes of care[11] rather than on the individual.

Process mapping can be used to describe and analyze how an individual clinician interacts with the system as well as with others within that system. Process mapping describes what an individual is required to do, in terms of cognitive processes and/or actions to achieve the system's goal. It can be accomplished through observations and/or interviews that carefully break down the multiple steps in the process.

Process maps can be created at different levels of granularity, from a high-level overview of the major steps in the process to very detailed representation of each specific step or activity. Detailed process maps are especially helpful to standardize and improve processes. For use as an improvement tool, it is important to map the current process, not the desired process, so that opportunities for improvement can be identified. Being explicit about the processes can help clinicians shape what they know about their environment and to provide insight into how to improve the process or overcome some of the barriers.

Everyday, multiple types of handoffs occur in health care settings, such as handoffs around shift changes of nursing shifts, referrals to specialty care, and discharge from inpatient to outpatient care. We found it valuable to select only one type of handoff for the process analysis—the handoff from postcall residents to on-call residents. This transition represents the period of time that a patient is cared for by a "covering" resident who may be unfamiliar with the patient's hospital course, a known risk factor for preventable adverse events.[12] In addition, our earlier work suggested that this handoff was particularly vulnerable, with the implementation of recent ACGME duty-hour restrictions.[5] The particular question that we posed to residents in the process mapping exercise was, "How does a postcall resident transfer the care of their patients to an oncoming resident?" We specifically asked how the content—the critical information required to care for patients during the coverage period—is transferred. We also asked residents to delineate the mechanism by which the oncoming resident formally accepts care of the patients (that is, the oncoming resident starts accepting calls from a "virtual pager" when they are on call, postcall

Process Map Tutorial

Steps for creating a process map:
1. Define the boundaries of the process. "This process begins with _____ and ends with _____"
2. The first boundary becomes the first step of your process
3. The last boundary is the last step of your process
4. List all the major steps that occur between
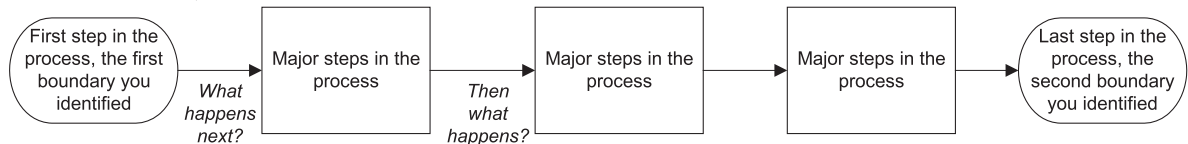
Some Reasons To Create a Process Map:	**Some Hints:**
√ Describe and document the process √ Generate with improvement ideas √ Determine best method √ Train others	√ Diagram the actual process—not what the process "should" be √ If you use "sticky notes" you can easily rearrange and add steps until you have a final draft

A key to the shapes used in flow charts:
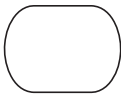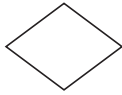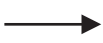
Ovals are beginnings and endings		Diamonds are questions or decision points	
Boxes are steps or activities		Arrows show sequence and chronology	

Figure 1. *This process mapping tutorial was used during the hand-off clinic.*

resident forwards their pager to the oncoming resident, and so on).

Figure 1 (above) includes a process mapping tutorial that was used during the hand-off clinic. Sample hand-off process maps for neurology and otolaryngology are included in Figure 2 (page 650) and Figure 3 (page 651), respectively. To analyze process maps, several questions are important to address to generate improvement ideas:

■ What is the goal of the process?

■ Does the process work as it should?

■ Are there obvious redundancies or complexities?

■ How different is the current process from the ideal process?

Although mapping the process is an important step in documenting the standardized protocol for handoffs, it can also be instrumental in educating new interns about the process. Furthermore, a process map can form the basis of the performance measurement tool to monitor and assess adherence to the process.

Build a Checklist of Necessary Content

In addition to developing a standardized process, it is equally important to determine the critical content to be transferred in a patient handoff.[13] Omissions of content are a major cause of failed communication during hand-offs.[5] A checklist of necessary information can help teach others new to the handoff about the process and
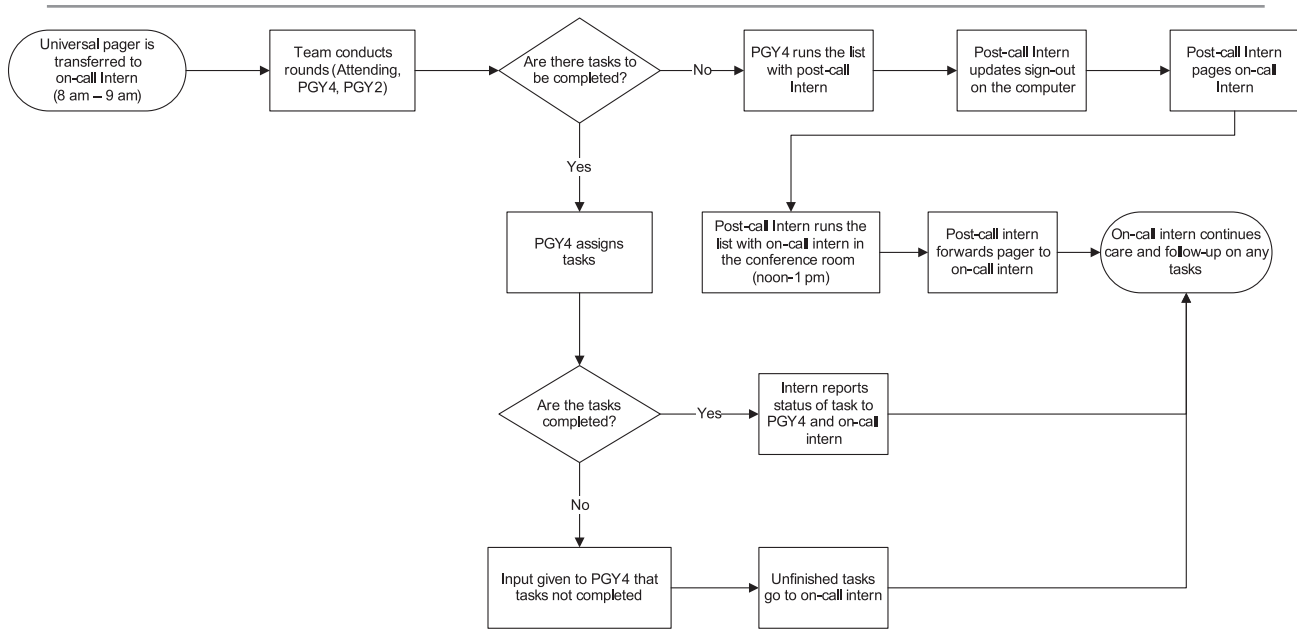
Process Map for Neurology Standardized Handoff

Figure 2. *The hand-off process map for neurology is shown. PGY, postgraduate year.*

serve as a monitoring tool in evaluating the content transferred. In designing a checklist, it is important to customize it for a specific discipline.

When thinking about what content to include in a checklist, one helpful tool is to interview the participants in the hand-off process regarding the information that they desire or need (Figure 4, page 652). A good starting point is to ask the following question: "What are the main content pieces of a handoff in your discipline?" The answers will likely result in a list of necessary patient content. A more detailed interview can elicit content that is part of an optimal handoff, in addition to content that may be omitted in a suboptimal handoff. To convert this content into a checklist, it is important to group this list into larger categories of content and smaller subcategories in each major category, as shown in the standardized content checklist for the pediatrics hand-off protocol (Figure 5 page 653). For example, administrative data or medications constitute large categories, whereas name, room number, and admitting team or service compose smaller subcategories under administrative data. Many programs may already use a template for written content, which may facilitate the creation of categories and subcategories of content. The checklist

will be perceived as more credible if it reflects technical jargon or refers to organizational or program-specific nomenclature used in daily patient care. For this reason, eliciting specific examples for how information is communicated during the interview is particularly helpful. Operator experience—the experience of those participating in the handoff—can influence the design of the checklist. For example, experienced physicians in hospital practice may not require the extensive checklist used by new interns. Finally, an acronym can serve as a reminder for critical content but also as a motivational tool to learn the new protocol.[14] For example, the acronym we used for the checklist for psychiatry residents was "psychiatry"—representing *p*sychiatric history; *s*pecial instructions; for *y*ou, for me (the to-do list); *c*ourt/legal issues; *h*ousing and social issues; *i*f/then; *a*dministrative data and allergies; *t*herapeutics; *r*esults of pertinent labs; and radiolog*y*.

Discuss Implementation Strategies

An implementation plan begins with dissemination of both the process map and the checklist of necessary content. Using an opinion leader in a residency program, such as a chief resident or program director, can help facilitate

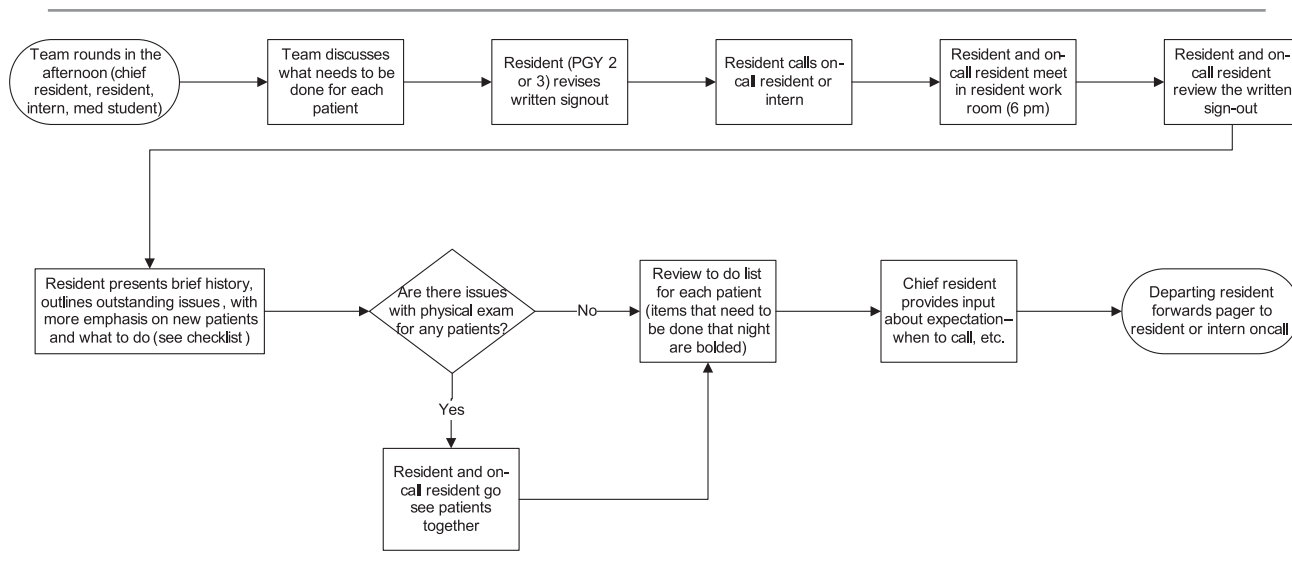## Process Map for Otolaryngology Standardized Handoff

Figure 3. *The hand-off process map for otolaryngology is shown. PGY, postgraduate year.*

this process. During the dissemination phase, other resident physicians should be able to provide input into both the process and the checklist. The importance of producing tangible documents—that is, the process map and checklist—cannot be understated. These documents can be distributed for everyone's input and clarification and can help facilitate input on the hand-off protocol. For example, are there other steps that are missing? Is the content checklist inclusive of the information needed? This input may dramatically improve the integrity and future buy-in of the standardized hand-off protocol.

Keeping a record of the input or suggested revisions and the response is important. Once a general consensus is reached, the process map and the checklist can be revised to incorporate suggested revisions. The new process map and checklist can then be distributed and used to educate students and residents on the handoff. These documents can also be particularly helpful when orienting new residents or students to the discipline.

Develop a Plan for Monitoring and Evaluation

To determine the success of implementing a standardized hand-off protocol, it is crucial that a plan for monitoring and evaluation be developed. Choosing an evaluation strategy can be challenging. The commonly accepted gold standard of patient outcomes may be particularly costly and difficult to determine. More readily accessible measures such as stakeholder satisfaction and peer ratings of the quality of the hand-off process can also be considered. In addition, periodic reviews of the handoff content and process through direct observation can be performed using the process map and standardized checklist. Although direct observation may be subject to the Hawthorne effect, using a variety of strategies to evaluate handoffs will address this concern. For example, in retrospective interviews, participants are queried regarding the quality of the process and content of the handoff. In a recent study, critical incident analysis was used to ask residents if they had any difficulty caring for patients as a result of a poor sign-out before their shift or duty.[5] An evaluation plan should also include sharing the information learned with the participants of the process to solicit more improvements, suggestions, or comments on observed deficiencies. In essence, this becomes a closed-loop process by which handoffs can be the target of continuous quality improvement efforts.

Findings from the University of Chicago Hospitals

We offered the hand-off clinic to individual residencies that take in-house call on an inpatient service. The

Checklist Interview for Standard Handoff

1. Are there categories of content on a template that your program/discipline uses?

IF YES ➞ For each category, what is an example of what is said (or written) or a common patient care issue that occurs that this content is used for?

2. In thinking about a time you participated (or observed) a "good" handoff, what types of information did you receive? How was it helpful in caring for a patient or performing your duty?

PROBE FOR ANY BIG CATEGORIES OF CONTENT ➞ What would staff say (or write)? Can you give me some specific examples?

3. In thinking about a time you participated (or observed) a "poor" handoff, what types of information were missing or inadequate? How did it impair your ability to take care of patients or perform your duty?

PROBE FOR ANY BIG CATEGORIES OF CONTENT? ➞ What would you wish staff would have said (or written)? Can you give me some specific examples?

Write the names of all of the big categories that emerged on the back of this sheet. Group like categories (to decrease redundancy) and think of a checklist acronym.

Figure 4. *Interviewing participants in the hand-off process regarding the information that they desire or need can inform development of a hand-off checklist.*

workshop employs a semistructured interview of residents to do the following:

■ Develop a standardized process for the handoff using a process mapping methodology.

■ Create a checklist of critical patient content.

■ Plan for dissemination and training.

To date, 7 of 10 residency programs have participated. We used process analysis to highlight similarities, differences, and areas for improvement among protocols. The hand-off process is highly variable and discipline-specific. Several themes emerged, as highlighted in the following sections.

Themes from the Process Analysis

Respect the Discipline's Environment, Culture, and Needs. To tailor the hand-off protocol to its users, the local environment in which the handoff is occurring (for example, intensive care unit, emergency room) and the type of patients cared for need to be taken into account.

Although four of the seven residency programs had a designated hand-off location, the other three conducted handoffs wherever convenient. For example, obstetrics and gynecology and psychiatry have an official meeting time and a dedicated room for handoffs, whereas internal medicine handoffs occur whenever convenient for the on-call resident (for example, emergency room, call room, ward). Only two programs had more senior residents present at the handoff, although for all seven programs, senior residents and/or attendings (usually during morning rounds or shortly after) provided input to the content of written sign-out sheets used at the time of the handoff. Similarly, although content checklists all contained some form of administrative data (for example, patient name, medical record number, room number), certain disciplines required unique elements of content. For example, pediatrics sign-outs contained fields to describe custodial arrangements (for example, parents, state's office for child and family services), whereas surgical sign-outs

Standardized Content Checklist for Pediatric Handoff

✓ **P**roblem List

> ☐ Any pertinent past medical history (e.g., cerebral palsy, seizure disorder)
> ☐ Systems-based list of current problems
> ☐ Focus on any invasive tubes/devices (e.g., GI-has g tube or Pulm-trach)

✓ **E**xpected tasks to be done

> ☐ Any labs to check on and what to do about them
> ☐ Tests to order or follow-up on (e.g., CT scans)

✓ **D**iagnostic one-liner

> ☐ Includes age, sex, relevant past history related to current problem and current chief complaint/reason for hospitalization (4 yo F with history of chronic severe asthma here with status asthmaticus)

✓ **I**f/Then

> ☐ Frequent issues to be expected with a plan to resolve using if/then format (e.g., "if HTN, please give Hydralazine")

✓ **A**dministrative data/Advanced directives

> ☐ Patient name, medical record number
> ☐ Room number
> ☐ Admission date
> ☐ Primary inpatient team, attending
> ☐ Family contact information
> ☐ Weight/BSA (body surface area)
> ☐ Code status

✓ **T**herapeutics

> ☐ Medications (updated list of medications with doses (esp dates that any antibiotics were started and duration)
> ☐ Diet with any weaning orders—Is the patient NPO?
> ☐ IVF
> ☐ Oxygen with weaning instructions

✓ **R**esults and other important facts

> ☐ Labs (e.g., recent Hgb/Hct)
> ☐ Cultures (esp any outside hospital cultures that were obtained)
> ☐ Radiology test results
> ☐ Consults

✓ **I**v Access/Invasive devices

> ☐ IV access and what to do if it comes out overnight (e.g., "Has PIV, must be replaced if it falls out")
> ☐ Any invasive devices listed in problem list

✓ **C**ustody and Consent Issues

> ☐ Is the patient DCFS (Department of Child and Family Services)?—if yes, need to get consents from them. Is child protective services involved?
> ☐ Parental custody or any issues related to parental custody

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Figure 5. *The standardized content checklist for the pediatrics hand-off protocol is shown. GI, gastrointestinal; Pulm, pulmonary; g, gastrostomy ; trach, tracheotomy; CT, computerized tomography; HTN, hypertension; NPO, nothing by mouth; IVF, intravenous fluid; Hgb, hemoglobin; Hct, hematocrit; PIV, peripheral intravenous.*

contained fields for pre-operative and postoperative checks. Residents in one program described "information overload" and "being a slave" to continuous updating of the written sign-out. A resident in a different program stated that handoffs only occurred if acute patient issues were present.

Despite these variations, all seven participating residency specialties use both a written summary or sign-out and a verbal exchange to execute a handoff. However, the amount of information recorded on the written sign-out and discussed at the verbal exchange differ. Cognitive-based specialties such as internal medicine and psychiatry appear to have a longer written sign-out sheet and a longer verbal exchange for each patient. Meanwhile, procedure-based specialties such as orthopedic surgery appear to have a more concise written sign-out, with verbal exchange for only those patients with active issues.

Aim to Understand and Reduce Variation. Although most residency program chief residents could articulate a protocol that was routinely followed, they also referred to deviations from the protocol. For example, whereas all residents interviewed stated that verbal communication was required and should occur at the time of the hand-off, all residents acknowledged that it did not always occur. One surgical resident stated, "sometimes the on-call resident [receiving handoff] is in the operating room." Indeed, the most common cause for the exceptions was the competing demands of resident work such that one of the participants was in the operating room, clinic, in transit to or from an off-site clinic, or otherwise unavailable for a handoff. However, at least one program chief stated that some residents coming on duty were more likely to make themselves available for verbal communication at the time of the handoff than others.

Highlight the Handoff as the Transfer of Professional Responsibility. The handoff is more than just transfer of information—it is also a transfer of professional responsibility. It is crucial that the handoff indicate a clear transfer of professional responsibility. When the transfer of professional responsibility occurs at the time or close to the time of the transfer of information, this process is transparent and easily understood. However, in many cases, the

transfer of professional responsibility was separated in time and space from the transfer of information. This separation can occur through a variety of different mechanisms. For example, some residencies, such as psychiatry, designate a certain time at which the incoming residents actively transfer responsibility of patients to themselves. The on-call psychiatry resident, who starts at 5:30 p.m., transfers a virtual pager to his or her own pager. By contrast, for other programs, departing residents may transfer their responsibility to someone else. In the internal medicine residency program, departing residents forward their pager to the on-call resident after they provide a verbal handoff.

Detect and Correct Vulnerabilities in the Handoff. A process map can be useful in assessing the integrity of the handoff process. By visualizing each step, vulnerabilities in the process can be detected and improved, as occurred in the neurology and pediatric residency programs. Patient tasks were assigned to other team members to facilitate timely departure of a postcall resident to comply with resident duty-hour restrictions. However, in both cases, no distinct mechanism was in place to communicate follow-up of these tasks, such as their completion or results, to the on-call intern. After examining the process maps, the chief residents incorporated closed-loop communication, requiring that follow-up that was divided among the medical team be relayed back to the on-call resident.

Implementation of the University of Chicago Hospitals Standardized Hand-off Protocols

Buy-in from senior leadership of stakeholders and ongoing education has been instrumental to the implementation of standardized hand-off protocols. Because this work deals with resident education and patient care, two stakeholders important to the success of implementation are the hospital leadership and leaders of graduate medical education, such as deans and program directors. With the support of the department of patient safety, in March 2006 we presented this initiative to the patient care committee, a subgroup of the hospital's board of trustees, which included senior institutional leaders. We also briefed

all residency and fellowship program directors at the institution's graduate medical education retreat in November 2005. At this briefing, we reviewed the Joint Commission National Patient Safety Goal and key literature and introduced our model for a standardized hand-off protocol. A few days later, with the assistance of the department of patient safety, we contacted the chief residents (by e-mail and pager) to schedule the hand-off clinics. On its completion, all participants agreed that the protocol would help improve current hand-off mechanisms and facilitate education of new interns.

The standardized protocols, accompanied by an explanation of the new National Patient Safety Goal, were disseminated to all incoming house staff during the orientation for new interns in June 2006. Residency programs are now expected to provide in-service sessions to their residents on the discipline-specific hand-off protocols during each academic year. We continue to work with those residency programs that have not yet developed standardized hand-off protocols and are expanding our focus to nursing and other types of interdisciplinary handoffs. To date, the major barrier for participation in the hand-off clinic is scheduling a time that is convenient within the restraints of the residents' service obligations. To develop a formal monitoring and evaluation process, we have partnered with the Illinois Hospital Association's 18-month Patient Safety Learning Collaborative on Handoffs, which currently has representatives from 26 Illinois hospitals.

Conclusion

The model to standardize the handoff has the potential to result in improved patient care. Mapping the process and building a standardized checklist of content can facilitate meeting the Joint Commission National Patient Safety Goal. Using opinion leaders and involving residents can be crucial to the success of disseminating the standardized hand-off protocol to resident physicians in an academic teaching hospital. J

Vineet Arora, M.D., M.A., is Assistant Professor, Department of Medicine, University of Chicago, and **Julie Johnson, M.S.P.H., Ph.D.,** is Assistant Professor, Department of Medicine, University of Chicago, and Director of Research, American Board of Medical Specialties, Evanston, Illinois. Please address correspondence to Vineet Arora, varora@medicine.bsd.uchicago.edu.

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Sustaining

Spreading and Sustaining Use of Standardized Handoff Protocols for Residency Training

Vineet M. Arora, M.D., M.A.P.P.; Julie K. Johnson, M.S.P.H., Ph.D.

Developing the Standard Handoff Protocol

For many industries that operate 24 hours a day, seven days a week, the exchange of information and responsibilities that occurs during shift changes is critical for maintaining continuity and safety in the workplace. In hospitals, *handoffs* (also known as *handovers*) serve as the basis for transferring care of patients from outgoing to incoming health care teams across shifts. The complexity associated with this process presents a "vulnerable gap" in patient care that can result in errors, near misses, and adverse patient events. There is little standardization and great variation across disciplines and health care organizations in the ways in which handoffs are performed. As a result, effectiveness of patient care is reduced and the potential dissatisfaction for patients and providers is increased. In general, handoffs of patient care have become a focus of worldwide patient safety improvement efforts.

The World Health Organization (WHO) listed "Communication During Patient Care Handovers" as one of its High 5 patient safety initiatives.[1] Improving effective communication throughout the hospital is also one of the patient safety goals of the Joint Commission, which, in 2006, made a "standardized approach to handoff communications" a National Patient Safety Goal (2E).[2] This goal was particularly challenging to academic teaching hospitals that train residents, who receive little to no formal education regarding handoffs.[3] This National Patient Safety Goal was also coupled with an increased focus on handoffs because of the adoption of the Accreditation Council for Graduate Medical Education (ACGME) duty-hour restrictions for residents in 2003.[4] General consensus and data from several studies confirmed that the handoff process was variable and needed focused improvement efforts.[5–7] Our previous work had demonstrated that poor-quality handoffs were characterized by omissions in critical content, such as medications

or code status, in addition to failure-prone communication processes, such as failure to meet face to face because of competing demands on resident time (for example, clinic or operating room). Therefore, in considering how to improve handoffs, we chose to consider them to be more than just an exchange of information or content and to include the process by which communication takes place.

To meet the National Patient Safety Goal and to provide a framework for improving communication during in-hospital care transitions, in 2005 we developed an interactive 90-minute workshop ("handoff clinic") to administer to chief residents at the University of Chicago Medical Center. During the interactive session, participants developed a standardized process for the handoff, created a checklist of critical patient content, and formulated a plan for dissemination and training. Although the model is generalizable, two principles guided the work[8]:

- Principle 1: Handoffs are discipline specific and well as organization specific.
- Principle 2: Standardization is the core goal for both handoff process and content.

In 2005, we put standard handoff protocols in place in the nine residency programs that take in-house calls on an inpatient service.[8] After chief residents participated in the handoff clinic, they took back the process map and critical content checklist to review with interns and residents who were routinely engaged in handoffs in their program for their comment in an open forum. During these forums, residents described barriers and facilitators to committing to certain steps, such as verbal communication. Any suggested changes were then incorporated into the process map and checklist. In addition, the importance of this education and training was emphasized in view of the ACGME duty-hour regulations. At times, during the handoff clinic, vulnerable steps in the process were described and corrected by chief residents. For example, in two of our programs, patient tasks

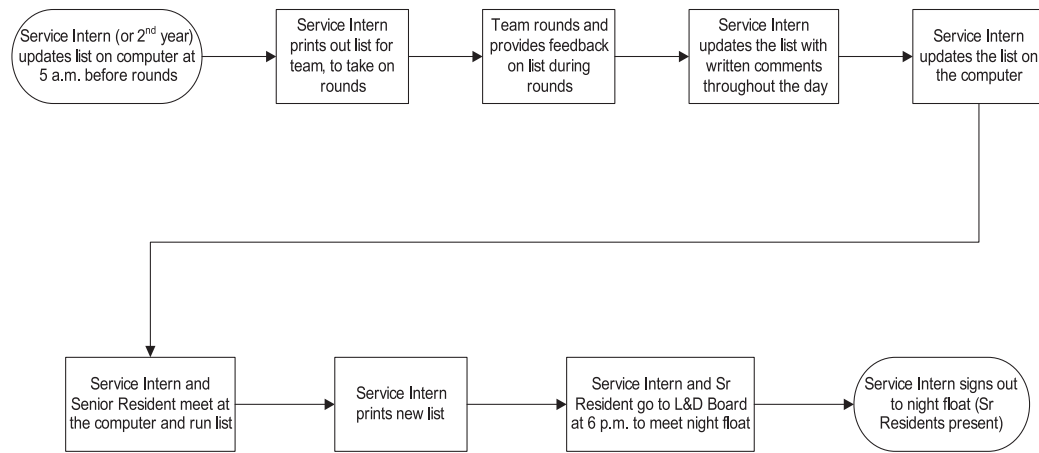# Sign-out Process for Obstetrics and Gynecology at University of Chicago

Figure 1. *The sign-out processes for obstetrics/gynecology (OB/GYN) at the University of Chicago is shown. L&D, labor and delivery. Used with permission.*

were assigned to other team members to facilitate timely departure of a post-call resident (to meet resident duty-hour restrictions) but results were not formally communicated to anyone. The handoff clinic facilitated the incorporation of "closed-loop" communication by requiring that follow-up on these tasks be conveyed to the on-call resident. As another example, although all disciplines required a verbal handoff, because of competing demands verbal communication did not always occur. In some cases, the transfer of professional responsibility was separated in time and space from the transfer of information, which may have led to confusion. For example, in one program, a resident would be receiving calls about patients at the start of the shift at 8:00 A.M. but did not receive the verbal handoff until noon.

Revisions were made as necessary, and chief residents used the newly created tools (process map and checklist) to adopt a standard handoff protocol for their respective specialties. The end result was a standard protocol and training tools that were customized for a specific specialty (that is, used the terminology of a particular specialty). The sign-out processes and checklists for obstetrics/gynecology are shown in Figure 1 (page 000) and Figure 2 (page 000), respectively, and the process for residents transferring a patient from the operating room to the post-anesthesia care unit (PACU) and the checklist are shown in Figure 3 (page 000) and Figure 4 (page 000), respectively. For example, the anesthesiology process map for the patient handoff from the operating room (OR) to the PACU reflects the fast-paced interdisciplinary environment of this handoff (over several minutes) and the critical importance of clear roles (for example, unit clerk provides bed slot number) and back-up behaviors by team members (for example, if no nurse is present, the resident steps in

to hook up the patient to the monitor) to ensure that care processes for patients, who may be unstable, continue. In contrast, the OB/GYN process takes place during the period from 5:00 A.M. to 6:00 P.M. and starts with updating "The List," as they refer to sign out in the morning for the team. Although the categories of content may be similar, the content and terminology for an obstetrics handoff is very different than that of a neurology or anesthesia handoff. This reflects the need for customization of content to accurately reflect the medical care provided to a specific patient.

In considering our work since this implementation effort, it is critical to consider sustainability and spread, which are fundamental to achieving lasting change in any improvement effort.

The Sustainability Process

Leading and Managing the Improvement

Sustainability requires sustaining champions, which can be increasingly difficult with a rotating workforce of junior doctors year after year. For example, our champions included the chief residents, who were actively engaged and able to make the necessary changes in their program. However, after one year they moved on to something else and were replaced by a cadre of new chief residents who were unfamiliar with our initiative. In this hierarchical environment, the importance of institutional leadership who endorse the sustainability effort cannot be underestimated. To sustain our educational efforts, we worked with the vice president of our hospital and the dean of medical education. With their support, we were invited to summarize our experience with program direc-

Checklist for Safe and Effective Sign out for OB/GYN at University of Chicago: "The List"

✓ **T**o-do
- o Labs to check and what to do with them
- o Tests to order
- o Dispo (e.g. what to do to get the patient home)

✓ **H**istorical data
- o Includes age, sex, relevant past history related to current problem and current chief complaint/reason for hospitalization (25 yo G3p2 F here with EGA 28 weeks IUP with PROM)
- o Pregnancy or cancer history
- o Any pertinent past medical history (i.e. HTN, DM, etc.)
- o Systems-based list of current problems

✓ **E**xpected or anticipated Issues overnight
- o Frequent issues to be expected with a plan to resolve using IF/then format (i.e. "if BP > x/y, please give Hydralazine," "CIS" etc.)
- o For pregnancies with contractions, plan for tocolytics or delivery?

✓ **L**abs and other results
- □ Labs (i.e. recent Hgb/Hct, etc.)
- □ Cultures
- □ Radiology test results
- □ Consults

✓ **I**dentifying and other administrative data
- □ Patient name, medical record number
- □ Room number
- □ Admission date
- □ Primary inpatient team, attending
- □ Family contact information

✓ **S**ickness
- □ Code status
- □ Is the patient going to get ill tonight?

✓ **T**herapeutics
- □ Medications (updated list of medications with doses (esp dates that any antibiotics were started and duration)
- □ Diet—Is the patient NPO?
- □ IVF
- □ Oxygen with weaning instructions

Figure 2. *The checklist for safe and effective sign out for obstetrics/gynecology (OB/GYN) at the University of Chicago is shown. Yo, years old; G3p2, Gravida 3 Para 2; EGA, estimated gestational age; IUP, Intrauterine pregnancy; PROM, Premature rupture of membranes; HTN, hypertension; DM, diabetes mellitus; BP, blood pressure; CIS, Culture if spikes; Hgb, hemoglobin; Hct, hematocrit; NPO, nothing by mouth; IVF, intravenous fluid. Used with permission.*

was emphasized, it was given equal billing with required safety training, such as what to do in the case of a needle-stick or required ACGME training in sleep deprivation. July 2008 marks the third consecutive year that we have been included in the new intern orientation lineup.

Making the Improvement Unavoidable

One thing that we have found particularly useful in sustaining this effort is the use of compliance. In other words, labeling participation or completion of the activity as required provides the leverage to ensure that the training is completed. To do this, we worked with the University of

tors at the graduate medical education retreat in November 2006—one year after the initiative went into place. In addition, because any initiative targeted at residents has potential for failure as the workforce is replaced year after year with new interns, we felt it was most important to embed the ideals of a safe handoff as early as possible, or when new interns arrived at the organization. With their leadership, we were scheduled during the coveted new intern orientation day-long event in July 2006 and provided with approximately 45 minutes to review the importance of handoff communications and the standard protocols and to describe the process by which each discipline would continue education. Although this may not seem like a major feat or that handoff communication

Chicago Medical Center's department of patient safety, which established a system to contact the chief residents in July of each year, starting in 2006. Each specialty (for example, surgical subspecialties, emergency medicine) selects approximately one to three residents to serve as chief residents, either in their senior year of residency or to serve an additional year after their training (for example, medicine, pediatrics). Because the chief residents (like the interns) are new every July, it is important to have a foolproof system to ensure contact with the appropriate leaders. After being contacted by the department of patient safety, the chief residents are told by e-mail about the importance of the initiative and the need to hold an in-service and are provided with a copy of the specialty-specific standard process and

Process for Anesthesia Resident to PACU Nurse Handoff at University of Chicago
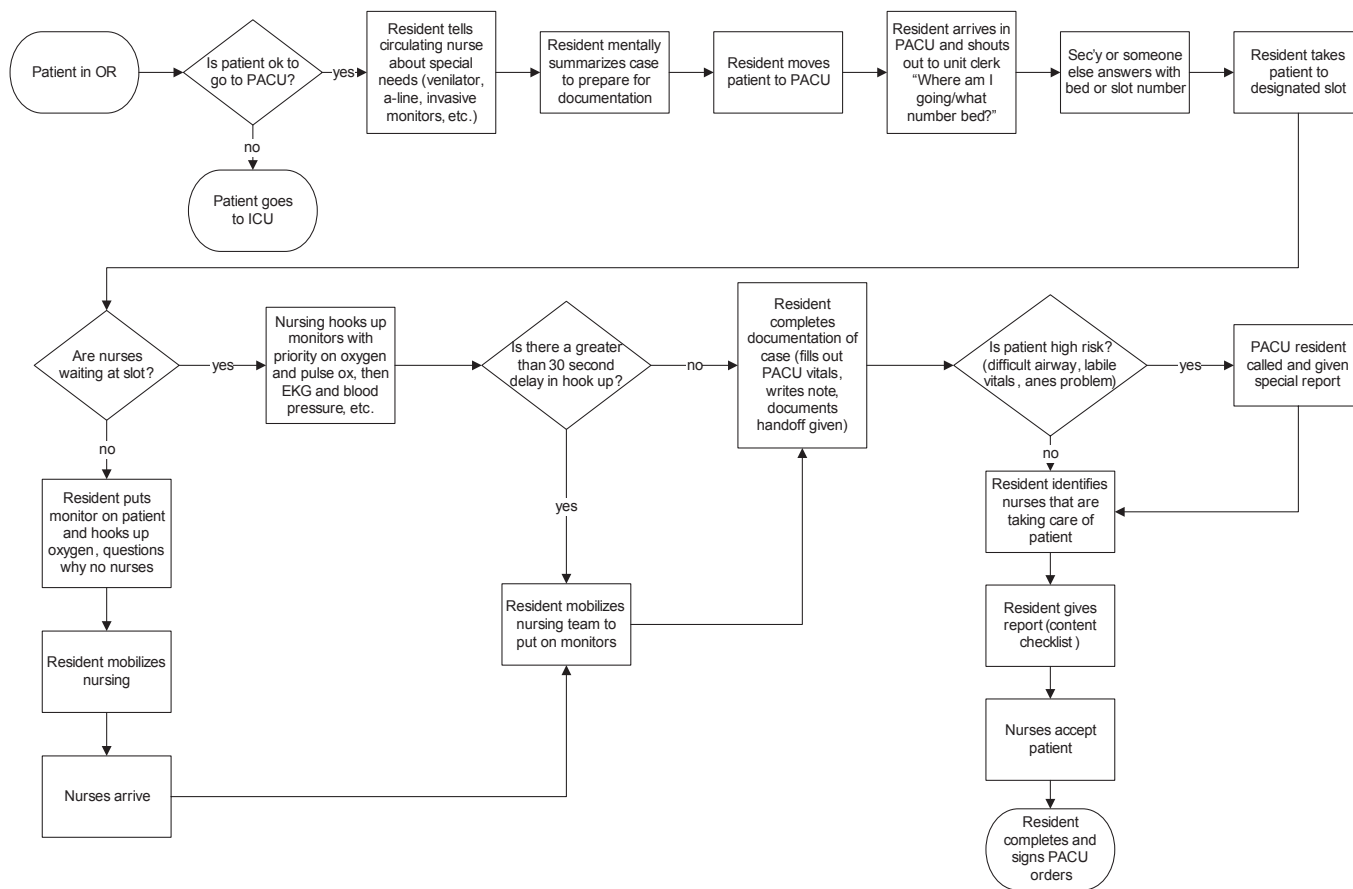

Figure 3. *The process for residents' transfer of a patient from the operating room to the postanesthesia care unit (PACU) is shown. ICU, intensive care unit; EKG, electrocardiogram. Used with permission.*

critical content checklist to use for handoff communication training. They are also told that the in-service will ensure that their program continues to be compliant with the Joint Commission Handoff National Patient Safety Goals. On scheduling the in-service, chief residents provide feedback to the department of patient safety and let us know how it went and if they received any questions.

Although use of compliance has been an important lever to sustain the educational effort in our case, it can be a dangerous tool to wield in the sustainability mission. This reflects the tension between "required" and "voluntary" change and extrinsic versus intrinsic motivation. For example, one of our interns reported that for the in-service in his specialty, the chief residents handed out the materials and stated that this education was a compulsory activity and the residents had to learn it, conveying their disengagement in the activity and that the only reason for performing the activity was to achieve compliance. Although we may change our message to highlight patient safety and the need for improvement, the initiative likely becomes a "compli-

ance" activity unless it is championed by the chief residents. To recruit chief resident champions, we are currently reaching out to incoming chiefs at an orientation event to explain the importance of this initiative and maintaining a coherent institutional approach.

Monitoring Performance

Monitoring and evaluating performance is crucial to the fundamental science of improvement. In some cases of clinical quality improvement, measures of improvement are easy to choose and consistently supported by evidence, such as the percentage of patients with diabetes who receive a yearly eye examination. In the case of handoff communication, however, appropriate process and outcome measures are less clearly defined.[9] For example, what is the outcome of a good handoff? One may think about satisfaction with the communication, but patient measures are hard to delineate with any certainty.[10] Process measures would address, for example, how well the process is adhered to most of the time and whether the critical content is present. However, another

Checklist for Anesthesia Resident to PACU Nurse Handoff at University of Chicago: "PACU To-Do" at University of Chicago

✓ **P**atient one-liner

- □ Identifying information (age, sex)
- □ Surgical procedure & surgeon
- □ Anesthetic used (i.e. MAC, epidural anesthetic, peripheral nerve block, general, etc.)
- □ Reason for surgery
- □ Example "Mr. Smith is a 65 yo M who just had a X procedure with Dr. Y b/c he had cancer."
- □ Pertinent past medical history with focus on major comorbidities (i.e. "pt also has DM, HTN, ESRD, HIV…"etc)

✓ **A**llergies, Weight, Vitals

- □ Allergies (specific statement if no allergies)
- □ Weight in kg
- □ Vitals if unstable

✓ **C**linical record in OR (routine)

- □ Medications given [esp narcotics, vasoactive substances (i.e. Labetolol); antibiotics, antiemetics (i.e. Zofran)]
- □ I/O's (UOP)
- □ What labs were done (i.e. ABG, pO2, Hgb, etc.)

✓ **U**nstable or unexpected (departures from routine) findings from OR

- □ Lability in blood pressure, glucose, other vitals, etc. and what was done ("labile BP requiring 4 sticks of labetolol")
- □ Inadequate anesthetic (i.e. "I don't think the epidural is working well")
- □ Unstable intubation/invasive devices or monitoring (i.e. "Difficult intubation with possible tooth chipped" or "the Arterial line is tenuous/positional")
- □ Patient communication barriers (deaf/blind/Spanish speaking, etc.)

✓ **To-do**

- □ Any labs or tests to order or follow-up on (i.e. CXR, ABG, etc.)
- □ Any orders that the resident is ordering
- □ Plan for post-op pain control, i.e. epidural, PCA, IV prns, po meds, etc)

Figure 4. *The checklist for anesthesia resident to the postanesthesia care unit (PACU) nurse handoff at the University of Chicago is shown. MAC, Monitored anesthesia care; M, male; DM, diabetes mellitus; HTN, hypertension; ESRD, end-stage renal disease; HIV, human immunodeficiency virus; OR, operating room; I/Os, inputs/outputs; UOP, Urine output; ABG, Arterial blood gas; pO2, partial pressure of oxygen; HgB, hemoglobin; BP, blood pressure; CXR, chest x-ray. Used with permission.*

administered to all the workshop participants, following the workshop (Table 1, page 000). We are currently fielding this survey with recent participants in the handoff workshop at MacNeal Hospital, whose experiences are described below. To evaluate the effectiveness of the handoff communication, we have worked with a team of investigators to create a standard instrument to evaluate handoffs in real time, the 10-item Handoff CEX. The Handoff CEX was adapted from the original mini-CEX, which was used to document competence in history and physical exams for medial trainees.[11] Like the original mini-CEX, each item uses a nine-point scale (ranging from "unsatisfactory" to "superior") to rate nine domains, including the quality of verbal communication, organization, content, clinical judgment, and professionalism/humanistic qualities displayed during the handoff. We are currently piloting the Handoff CEX with our pediatrics residency and with nursing handoffs at Yale University (with the help of Dr. Leora Horwitz). In addition, we are working with another colleague, Dr. Jeanne Farnan, on a validation study of the Handoff CEX using a simulated handoff experience with trained resident receivers for fourth-year medical students. Finally, we have created a 12-item peer evaluation for residents on handoff quality which is based on the ACGME core competencies and is currently completed by internal medicine interns at the end of their inpatient general medicine rotation. Each item corresponds to a specific ACGME core competency. For exam-

barrier in the case of handoffs is that the timing of this communication is somewhat variable, making planned audit by direct observation by an external observer very difficult. Therefore, the goals of our evaluation strategy were two-pronged:

1. To evaluate the improvement activities related to the handoff workshop.
2. To evaluate the effectiveness of the handoff communication from the perspective of the participants, particularly receivers of handoff communication who are present at the time of the handoff—and in a position to evaluate the effectiveness of the communication on the basis of whether it met their needs for safe and effective patient care.

To evaluate the improvement activities related to the handoff workshop, we developed a questionnaire that is

Table 1. Handoff Workshop Evaluation*	
1. Which handover did you work on as part of the Handoff Workshop?	
2. Did participation in the Handoff Workshop give you the tools needed to change your handover process?	❏ Yes ❏No

If yes, how did the process change?
  ■ Detail changes made in your handoff process
  ■ Describe the results of those changes	

3. Do you think the changes you've made are sustainable?	❏ Yes ❏No
If yes, what gives you confidence that these changes are sustainable?	
4. What are the remaining challenges to sustainability?	
5. What did you find most useful about the Handoff Workshop?	

*Used with permission.

ple, under the ACGME core competency of professionalism, we ask interns to rate their peers on their responsiveness to being paged about sign-out and also the appropriateness of the time and content they are signing out (for example, "signs out as early in the day as possible, leaving tasks that she should have performed"). For the core competency of communication, interns rate their peers regarding their listening behavior and use of interactive questioning. Similarly, reflecting medical knowledge, interns rate their peers on anticipatory guidance given during the sign-out and also the clinical decisions made while cross-covering patients.

In addition to developing instruments to assist in monitoring the quality of handoff communications, we are also working with frontline champions on key areas that require more intense monitoring. As an example, in one of our residency programs (in fact, the one in which the chief residents viewed improvement as something "they had to do"), we are working with an intern on a monitoring plan that entails interviewing the post-call and on-call interns for four days a month shortly after a handoff about the three most important items conveyed during the handoff communication. The responses of post-call and on-call interns are compared to assess agreement. In one post-call/on-call dyad, for example, the post-call intern revealed that she thought that the on-call intern would glean the following prioritized information and tasks from her sign-out: first and most importantly, make sure the patient is off oxygen; second, switch the patient from by mouth (PO) to intravenous (IV) steroids; and third, wean the patient off albuterol nebulizations overnight. When interviewed, the on-call intern, how-

ever, claimed that the prioritized information and tasks were as follows: first, switch the patient from IV solumedrol to PO; second, give the patient a flu shot; and third, give the patient asthma education. These data also provide the groundwork for a future improvement intervention.

There are still limits to this evaluation approach, because it is unclear whether handoff quality can be assessed prospectively in real time. It is often only after a shift that one can examine the events that occurred and consider the information that may not have been present in the handoff.

Therefore, we have also adapted a post-handoff survey to conduct 24 hours after a handoff to elicit missed information and possible adverse events or near misses due to poor handoffs.[12] We have also used this survey to examine the quality of handoffs between hospitalists during service change in an effort to develop a standard protocol in this area.

Changes in the Focus of the Initiative and Spread to Other Areas

In addition to improving resident physician handoffs, several key institutional leaders also emphasized the importance of engaging nursing leaders and champions in the process to ensure patient safety during these critical transitions. In response, in January 2006, we began working with an interdisciplinary team of nursing staff that attended one of our resident handoff clinics as observers. They observed the four-step model (process, content, implementation, and monitoring, as shown in Table 1[2]) in action, in which front-line staff were engaged as observers and participants in

Patient Care Profile, University of Chicago

University of Chicago Hospitals Patient Care Profile

Room: _____ Date of Admission: _____ Date/Time of Arrival on the Unit: _____
Name: _____ Age _____ Sex: F/M

Service: _____ Attending: _____ Resident: _____ Pager: _____

S Situation	Allergy(ies): Drug _____ Food: _____

S Situation

Allergy(ies): Drug _____ Food: _____
_____ _____ _____

Height: _____ Weight: _____ Code Status: _____
Diagnosis: _____

Surgical Procedure(s): _____

_____

_____

Mental Status: _____ Restraints : Y/ N   Sitter: Y/N
Precautions: Isolation _____ Fall ____ Seizure _____ Aspiration _____

B Background

Past Medical History: _____

Past Surgical History & Year: _____
_____ _____

Parameters: T: >___ HR:>____< ____ RR: >____ < ____ UOP: < _____ SBP: > _____ < ___
DBP: > ___ < ___ 02 Sat < ___ Pain goal:

Vitals: (frequency)_____ Blood Sugar _____ / SSI starts at: _____
monitoring:(frequency)
IV Fluids: _____ site:_____ date: _____
: _____ site: _____ date: _____
: _____ site: _____ date: _____
: _____ site : _____ date : _____
: _____ site : _____ date : _____
Dialysis access : _____
Diet: _____ Tube feeding: _____ Type of tube: _____

Calorie count: Y/N   Daily Weight: Y/N   Neuro Checks: Y/N   Activity: _____
_____

Wound/Incision: _____ Dressing Change/
Frequency: _____
Wound/Incision: _____ Dressing Change/
Frequency: _____

Wound/Incision: _____ Dressing Change/
Frequency: _____

Wound/Incision: _____ Dressing Change/
Frequency: _____

Figure 5. *The Patient Care Profile is divided into the corresponding Situation, Background, Assessment, and Recommendation (SBAR) sections for use during nursing-shift changes. HR, heart rate; RR, respiratory rate; UOP, urine output; SBP, systolic blood pressure; DBP, diastolic blood pressure; O2, oxygen saturation; CPT, chest physiotherapy; NEBS, nebulizers; TEDS, Ted hose; ALPS, silicone lotion (brand name). Used with permission.*

structural approach or order to the verbal interaction during handoffs. They chose to adopt the Situation, Background, Assessment, and Recommendation (SBAR) model to communicate critical information.[13] In addition, they created a document, the Patient Care Profile, which was divided into the corresponding SBAR sections for use during nursing-shift changes (Figure 5, page 000). Pilot testing, led by nursing champions, occurred in labor and delivery and on one surgical floor. The importance of customizing the patient care profile was apparent for specific patient issues that are routinely seen. For example, a nurse on a medical intensive care unit (MICU) would require different types of data in the "Background" (for example, intubation) field than would a nurse on a general surgery floor (for example, wounds, dressing changes, day of last surgery). A one-size-fits-all approach would not work. Therefore, during scale-up to all nursing staff, an SBAR Tool Kit was created to provide information to nursing staff on each floor about how to designate a champion, work to create a customized Patient Care Profile using the SBAR model, and then pilot test it for one month. The MICU

describing and improving the process. Two of these nurse champions then considered how to adapt the model to nursing. Unlike our residents, who already had a written sign-out template to support handoffs in place, our nurses did not have a written template to convey information at the change of shift but instead often took handwritten notes on a piece of blank paper.

The nursing team also expressed the need to adopt a staff nurses, for example, developed the MICU SBAR Patient Care Profile (Figure 6, page 000), which focused on respiratory issues and IV access for their patients, who are likely to be intubated and on vasopressors. In addition, process maps were created to better identify the work flow around the shift change and were posted in each unit for comment so that consensus could be achieved. Our nurse partners report that satisfaction with communication during

handoffs has increased, with a general feeling that there is more structure and expectation for shift change. For example, nurses now refuse to engage in shift change unless a Patient Care Profile is completed. This preliminary experience demonstrates how the model we used for standardizing handoffs for residents could be adapted and modified to meet the needs of frontline nurses at our medical center.

In addition to attempting to improve handoff communications at shift changes between physicians and between nurses, we have also engaged in an interdisciplinary effort to improve communication during all types of handoffs with one of the University of Chicago's Medical Center community affiliate hospitals, MacNeal Hospital in suburban Berwyn, Illinois. Through the leadership of MacNeal Hospital's chief medical officer, we were invited to two sessions in early 2008, one month apart, to engage teams in process improvement around the handoff. The teams were diverse in their patient care responsibilities, as were the handoffs chosen to improve, which were as follows:

- Transfers of care between rehabilitation and home
- Transportation of a patient to a radiology test
- Transfer of a patient from the intensive care unit to the floor
- Transfer of a patient from the emergency department to the general ward

The teams engaged in a process mapping exercise in which the team had to produce a process map. Because of the interdisciplinary nature of many of these handoffs, teams realized that they needed representation from other areas that played critical roles in the handoffs. For example, the patient transporter teams quickly realized they needed representatives from nursing who help prepare the patient

for transport and radiology technicians who receive the patient. The teams, in a process similar to the one previously used by residents and nurses, created process maps of the handoffs and then posted or disseminated them to local frontline staff for comment to improve consensus and achieve buy-in. Some of the teams recognized vulnerabilities in the process and engaged in a small test of change to improve handoffs. For example, the transporter team piloted the use of a "ticket to ride" system with a checklist created to reflect the critical issues to be addressed before a patient transport.

Patient Care Profile, University of Chicago, *continued*

B
Background – cont
	Respiratory: (CPT/NEBS & Frequency) _____ Trach/Size _____
	            Oxygen support: _____
	Is/Os: Drains: _____ Tubes: _____ Last BM: _____
	        Foley: _____ Others: _____ _____ _____
	            _____ _____ _____ _____
	
	Pertinent Labs Results: _____
	Routine labs to be drawn: _____

A Assessment	**Significant events/Date:** (Information in this section should answer some of the following questions: What do you think is going on with this patient? Do you have concerns? If so, what are they? How severe? Is there a problem that could be life threatening? Did you start anything that could not be finished on this shift?) : _____ : _____ : _____ **Procedure/s completed/date completed:**
R Recommendations	**Nursing Interventions** (Information in this section should answer some of the following question: What would you like the incoming nurse to attend to? What have the physicians been told? Not yet told? Has anything been left undone? Did you start anything that could not be finished on this shift?) **Special** **Instructions:** TEDS/ALPS: _____ Incentive Spirometer: _____ (Triflo)

Day Shift / Evening Shift / Night Shift

Clinical Goal:	Patient Goal:

Figure 5. *Continued.*

Chapter 6: Sustaining   95

Medical Intensive Care Unit (MICU) SBAR

MICU SBAR

Patient Sticker

S

Name _____ Age _____ Sex F / M

Family contact_____

Date of Admission _____ Attending _____ Intern/pager_____
HT _____ WT _____ Code Status _____ Allergy_____
Reason for Admission /Dx: _____

Fall Precaution: Y / NA_____ Restraints: Y / NA_____
Isolation: Y / NA Type _____
Surgery / Procedures: Date: Surgery / Procedures   Date

B

Past Medical History: _____

Past Surgical History / Dates: _____

Parameters_____

IV Access: 1)_____ Date Inserted: _____
              2)_____ Date Inserted: _____
              3)_____ Date Inserted: _____

IV Drips / Fluids: 1) _____ titrate to_____
                    2) _____ titrate to_____
                    3) _____ titrate to_____
                    4) _____ titrate to_____
                    5) _____ titrate to_____

A

Mental Status: _____
Respiratory:
          O2/NO/HO t: _____Trach/ETT inserted/chged _____
          Settings: _____
          CPT/NEBS & frequency) _____
Cardiovascular: Rhythm: _____ PPM _____ AICD _____
          VAD _____ Setting _____

GI: Diet: _____TF _____
          Gastric / Feeding Tube: type _____ Location: _____
          Residuals_____ Last BM: _____

GU: Catheter Type: _____Size_____ Date inserted/change: _____
Skin / wound Status:
Wound/stage: _____Tx_____
Wound/stage: _____Tx_____
Wound/stage: _____Tx_____
Wound consult done_____
Pain / Agitation Assessment: Verbal _____ NVPS _____RASS _____
Activity: _____
Social Issues: _____

R

What's the goal for your shift?
_____
_____

Any changes in the patient's status that requires change in the patient's plan of care?
_____
_____
_____

Any labs / special endorsement?
_____
_____

Continue with current plan of care.
_____
_____

Miscellaneous:

Figure 6. *The MICU Situation, Background, Assessment, and Recommendation (SBAR) focused on respiratory issues and intravenous (IV) access for their patients, who are likely to be intubated and on vasopressors. ETT, endotracheal tube; AICD, automatic implantable cardioverter defibrillator; VAD, ventricular assist device; BM, bowel movement; Tx, treatment. Used with permission.*

Lessons Learned

Our work in standardizing approaches to handoff communications suggests the following lessons learned:

1. **Institutional endorsement by leaders is necessary to make the change part of the culture.** Strong institutional leadership is required for improvements to sustain, particularly in an environment in which frontline personnel year to year make transitions from one care area to another, as in a residency teaching hospital. Cementing the change must be part of the organizational culture and expectation set by leaders and visible at the time new staff are introduced into the system. Incorporating the handoff education into new intern orientation is one way we are able to sustain our effort.

2. **Although compliance is a strong lever, it can also undermine participants' recognition that the improvement is important.** Mandating improvement activities is a double-edged sword. Although this represents a sure-fire way to ensure participation in the improvement activity, it can also engender a hostile attitude toward improvement and distract from the need to make changes. It is therefore critical to ensure buy-in regarding the vision for change from the outset and to then use compliance as a lever to ensure that change occurs. Realistically, compliance is the driver for the organization, but for the frontline caregivers, the driver is the potential to improve work processes that may ultimately lead to improved patient care.

3. **A one-size-fits-all approach will not work.** To achieve sustained change, one needs to consider adapting interventions for the local environment and end user. In all our spread efforts, a consistent theme is that a one-size-fits-all approach will not work. This may appear antithetical to the need to standardize and adopt systemwide changes in improvement science. However, this lesson really refers to the need to tailor the intervention to the local environment and context. The importance of local adoption by end users should not be ignored. Participant engagement in process redesign enables improvements to be recognized within a user's work flow and described in a user-defined language, facilitating greater adoption and

sustainability. This is highly evident in our nursing efforts and recent efforts in a community teaching hospital.

4. **Define the appropriate measures to be used in the monitoring effort and plan for the resources necessary for monitoring.** Intervention mechanics, adoption, and implementation are often the focus and consume the majority of effort for any improvement work. Evaluation is often an afterthought and may not occur because of lack of resources or poorly defined measures for the improvement effort. To truly ensure fidelity of the intervention and the sustainability of the associated changes, monitoring is critical. Therefore, investing time in tool development and piloting to collect baseline data is important to ensure that change has occurred. Although a lack of suitable measures and resources for evaluation limited our ability to perform a formal evaluation, we have focused on developing tools for future efforts.

Conclusion

Sustaining our standard handoff initiative has been characterized by both successes and challenges. Early successes include integrating handoff education into high-profile orientation events for hospital staff and spreading the model to nursing in our own medical center and interdisciplinary handoffs in a community hospital. Challenges include maintaining the enthusiasm of the initial effort and addressing the pessimism that emerges when making improvement a required activity is seen as part of "compliance." The future steps in communication regarding our handoff efforts include developing stand-alone educational materials and toolkits that can support future improvement activities in other health care settings. These materials would serve to disseminate the model of improvement (for example, process maps, content checklists, education) for handoff communications while ensuring that users could adapt the model to serve their local needs. In addition, we continue to work on developing and piloting tools to measure the quality of the process and content of handoff communications.

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Improving clinical handovers: creating local solutions for a global problem

Julie K Johnson,[1] Vineet M Arora[2]

The clinical handover serves as the basis for transferring responsibility and accountability of patient care from outgoing to incoming healthcare teams across shifts, across disciplines and across care settings.[1] There has been a groundswell of interest in clinical handovers, which has taken shape in the form of research, policies, guidelines and quality improvement efforts. The buzz generated by these efforts has resulted in handovers jostling for top position as one of the hottest topics in the global patient safety arena. The World Health Organization (WHO) listed "Communication during Patient Care Handovers" as one of its High 5 patient safety initiatives.[2] Improving effective communication throughout the hospital is a lead patient safety goal put forth in the USA by The Joint Commission.[3] The Australian Commission on Quality and Safety in Health Care (ACQSC) has identified clinical handovers as a particular focus for 2009.[4] Policies and guidelines for handovers extend to physician trainees as well, as evidenced by the guidelines put forth by the Junior Doctors Committee of the British Medical Association.[5] The Institute of Medicine in the USA has also recommended that "all trainees receive formal training in handoff communications."[6] In essence, interest in the communication act during a transition of care—whether we call it a handover, hand-off or sign-out—has grown steadily over the past decade as researchers, hospital administrators, educators and policy makers have come to realise that the potential breakdown in communication during patient handover is a serious issue affecting their institutions, their clinicians and their patients.

As the research has burgeoned, there are several simple points on which most researchers agree:[1 7–9]

▶ Handovers are a vulnerable time in patient care.
▶ There is little standardisation and great variation across disciplines and healthcare organisations in the ways in which handovers are performed.
▶ Limits on physician duty hours lead to increased handovers.
▶ Handovers are rarely taught to junior doctors in a systematic way.

Three papers in this issue **(see pages 248, 267, 261)** support these themes but go beyond the global problems to highlight specific issues that must be addressed to improve clinical handover.[10–12] In a study of sign-outs among US internal medicine house staff, Horwitz *et al* concluded that technical and cultural changes in the handover process could improve quality of information transmission.[11] The finding that key clinical information was available only two-thirds of the time in either written or oral sign-out points to a technical need for standardising the key content and providing a template for written sign-outs. These technical improvements can most likely be accomplished with local quality improvement efforts. However, cultural changes such as involving the primary team whenever feasible, emphasising the role of sign-out in maintaining patient safety and fostering professional responsibility are also needed. Achieving these cultural changes continues to challenge many of our quality improvement efforts.

Cleland *et al*'s study of physicians at various stages of training and night nurses in the UK concluded that new doctors feel unprepared for handover, and their handovers are viewed by others as poor.[10] She suggests that certain clinical skills are required, but she adds that professional attitudes are also essential. Similarly, Philibert suggests that the handover is not merely a communication task but a clinical skill in which residents' diagnostic, clinical and decision-making abilities underpin the skills for the actual hand-off task.[12 13] Philibert also highlights the importance of trust during clinical handovers—whether the resident receivers actually perceive the content of the hand-off to be accurate and reliable. Similarly, our studies support that this trust, or rather lack of trust, drives resident behaviour after handovers. For example, a resident who does not trust information received during handover will ultimately check each detail of each patient to obtain information needed to provide the best patient care.[14]

This of course begs the question: why have a handover if the information is not used? Perhaps a more realistic framing of the issue is: what changes are needed so that the resident trusts both the content of the handover as well as the sender of information? Larger issues, such as the culture of training, supervision and formal education, will have a major role in improving trust.

Clearly, the problems experienced during clinical handover are global. Systems issues are universal and at the heart the breakdown in communication during the handover process which can lead to patient harm. Countless studies conclude that many of the current processes for conducting handovers are not effective. What are the implications of the existing research on how we think about improving handovers? The findings from the papers in this issue have implications for the path forward, yet they suggest that the field is stuck between more research and practice change. All authors call for more research. Handovers are now plagued with the age-old problem of not translating the findings of current research into improved practice.

Several thoughts guide our recommendations for future research that is tailored to integrate the research on handovers into our efforts to improve handovers. First, focus the improvement efforts on the content and the process. Improving the handover process will require an appreciation of the inherent link between explicit processes and results. Include physician trainees in the redesign of the handover process. Handovers are a critical component of the junior doctor work life. We have had success in coupling the research with resident-driven improvement projects that result in both an improved handover process and junior doctors with skills needed to make improvements in their own practices.[14] Electronic tools may be particularly useful

[1] Centre for Clinical Governance Research in Health, Faculty of Medicine, University of New South Wales, Sydney, Australia; [2] University of Chicago, Chicago, Illinois, USA

Correspondence to: Dr Julie K Johnson, Centre for Clinical Governance Research in Health, Sydney, NSW 2052, Australia; j.johnson@unsw.edu.au

for standardising the content and creating templates for the written handover. Well-designed, ergonomic solutions and consistent policies regarding the use of these resources increase the chances for successful adoption of such tools.

Second, recognise the effect of local culture as a key enabler for change and improvement. The culture of the care giving unit underpins all processes and all improvement of care. Efforts at quality improvement often have limited success because they ignore the local context. This is the problem when we try to transfer a best practice into another setting with adapting it to the local culture. Horwitz et al point out that it is possible to use the multiple purposes of the handover to facilitate a supportive culture. Handovers serve a number of purposes beyond the transfer of clinical information, and while these purposes are sometimes at odds, they can be harnessed to develop and maintain a culture that prioritises and enhances patient safety.[11]

Third, develop and implement a competency-based handover training programme for frontline clinical staff. For the most part, handovers are taught implicitly through "on the job training" with information carried down through generation of junior doctor. There is a need to develop formal training to teach these skills to incoming cohorts of residents. At a minimum, residents need formal didactic instruction on the importance of the handover for patient safety, research highlighting ineffective handover communication, strategies for safe and effective handover communication, and the local expectations regarding handover process and content. Developing the template for such educational efforts can be facilitated by national or global medical education bodies who have a vested interest in improving handovers while work hours of medical trainees are shortened throughout the world. To improve and monitor handover practice among medical trainees, it is important to create a safe space for residents to practise their handover skills. At the University of Chicago, we have piloted a low-cost simulation with standardised resident

receivers for graduating medical students that we are actively disseminating to other institutions.[15] In addition, the training effort needs to be sustained monitoring and providing feedback about individual performance.

Fourth, incorporate new methods for improving quality of handovers. There are approaches to improving quality of care that may be particularly relevant for improving the complex handover phenomenon. For example, in this issue, Jeffcott calls for research that focuses on resilience and on understanding how frontline staff "fix" mistakes *(see page 256)*. She outlines a process that includes characterising the gaps in the process, learning how the gaps develop, understanding the gap within a particular context, understanding the relationship between the gap and the outcomes of care, and understanding how experts successfully bridge the gaps.[16] Resiliency research could fit well with positive deviance, which is an approach that identifies innovative strategies from organisations that consistently demonstrate exceptionally high performance in the area of interest, in this case the clinical handover.[17] Another method, Soft Systems Methodology (SSM+), is an iterative staged framework that emphasises collaborative learning and systems redesign in involving both technical and cultural fixes.

There are many ways to get to an improved handover process that results in more effective communication for the transition of patient care—the standard process and the core content, the foundation of guidelines. The most difficult challenge lies in how to create the culture that supports the changes that are required and facilitates the learning. How do we draw on all available wisdom about what is needed to improve handovers, coupled with a systems approach to understanding and improving care at the front lines of care where patients and providers meet?

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